Module 6   Systems Analysis and Design 1

Module title	Systems Analysis and Design 1
Module NFQ level (only if an NFQ level can be demonstrated)	n/a
Module number/reference	BSCH-SAD1
Parent programme(s)	Bachelor of Science (Honours) in Computing Science
Stage of parent programme	Stage 1
Semester (semester1/semester2 if applicable)	Semester 1
Module credit units (FET/HET/ECTS)	ECTS
Module credit number of units	5
List the teaching and learning modes	Direct, Blended
Entry requirements (statement of knowledge, skill and competence)	Learners must have achieved programme entry requirements.
Pre-requisite module titles	None
Co-requisite module titles	None
Is this a capstone module? (Yes or No)	No
Specification of the qualifications (academic, pedagogical and professional/occupational) and experience required of staff (staff includes workplace personnel who are responsible for learners such as apprentices, trainees and learners in clinical placements)	Qualified to as least a Bachelor of Science (Honours) level in Computer Science or equivalent and with a Certificate in Training and Education (30 ECTS at level 9 on the NFQ) or equivalent.with a Certificate in Training and Education (30 ECTS at level 9 on the NFQ) or equivalent.
Maximum number of learners per centre (or instance of the module)	60
Duration of the module	One Academic Semester, 12 weeks teaching
Average (over the duration of the module) of the contact hours per week	3
Module-specific physical resources and support required per centre (or instance of the module)	One class room with capacity for 60 learners

Analysis of required learning effort		
	Minimum ratio teacher / learner	Hours
Effort while in contact with staff		
Classroom and demonstrations	1:60	36
Monitoring and small-group teaching		
Other (specify)		
Independent Learning		
Directed e-learning		
Independent Learning		54
Other hours (worksheets and assignments)		35
Work-based learning – learning effort		
Total Effort		125

Allocation of marks (within the module)					
	Continuous assessment	Supervised project	Proctored practical examination	Proctored written examination	Total
Percentage contribution	60%			40%	100%

Module aims and objectives

The world is constantly changing with new and emerging digital technologies bringing many challenges to the commercial world. This module aims to support learners as they develop a broadly based and intellectually challenging framework in the area of systems analysis and development. Learners gain an awareness of current technologies, literature, and research in the area. Learners are expected to apply the principles to both current and developing technologies. Learners achieve this through developing knowledge and skills in the area. Further, they cultivate an understanding of how the insights and practice contribute to the current state of the art in the wider Computer Science landscape.

Minimum intended module learning outcomes

On successful completion of this module, the learner will be able to:

1. Compare types of information systems and their uses in a business context

2. Discuss the concepts in the system development life cycle

3. Identify problems and organize requirements of an information system in an organisational context

4. Carry out a feasibility study for a proposed IT solution to a defined a business problem

5. Develop a project scope, and project plan based on effective feasibility analysis

6. Explain effective requirement gathering and risk management techniques to project development

Rationale for inclusion of the module in the programme and its contribution to the overall MIPLOs

Developing systems is not merely a matter of writing code. The process of defining the scale and scope of a project to assure completion in a timely manner and with the expected feature set is a vital element of development. This module introduces the beginnings of this concept to the Learners. Appendix 1 of the programme document maps MIPLOs to the modules through which they are delivered.

Information provided to learners about the module

Learners receive a programme handbook to include module descriptor, module learning outcomes (MIMLO), class plan, assignment briefs, assessment strategy, and reading materials.

Module content, organisation and structure

Fundamentals of Systems Analysis

- Organizational impact on Information System
- Types of Information Systems
- Systems analyst role
- Types, trend and approach towards developing information system

Project Planning Process

- Project Feasibility Studies
- Project Management Overview
- Project Initiation
- Scope definition and Work Break Down Structure
- Project schedules and scheduling techniques (Gantt Chart, CPM, PERT)
- Basic principles of project cost management

Information Requirement Task

- Information Gathering – Interactive Methods
- Information Gathering – Unobtrusive Methods

The Analysis Process

- Systems Analysis Tools & Techniques
- Introduction to Data Flow Diagrams (DFD)
- Continue with Analysis Process
- Design logical DFD of current and To-Be system
- Design physical DFD

- Describing Process Spec (decision trees, table, structure English)

The Design Task
- Design Structure Chart
- Designing Effective Output
- Designing Effective Input
- Design data storage
- Designing User Interfaces

Systems Implementation
- User Testing and acceptance test
- Training plan & strategies
- Implementation plan & strategies

Module teaching and learning (including formative assessment) strategy
The module is taught as a series of Lectures. The lecture sessions discuss and explain to learners the theoretical underpinnings of how software systems are specified and designed.

Assessment is divided into four elements. First there are a number of tutorials that assess the learner's competency in specific topics on a weekly basis. There is a mid-term class test. There is then a take home assignment. Finally, there is an end of semester exam that tests the learners understanding of the theoretical material.

Timetabling, learner effort and credit
The module is timetabled as one 3-hour lecture per week.

The number of 5 ECTS credits assigned to this module is our assessment of the amount of learner effort required. Continuous assessment spreads the learner effort to focus on small steps before integrating all steps into an e-portfolio to document experience throughout the semester.

There are 36 contact hours made up of 12 lectures delivered over 12 weeks with classes taking place in a classroom. The learner will need 44 hours of independent effort to further develop the skills and knowledge gained through the contact hours. An additional 55 hours are set aside for learners to work on assignments that must be completed for the module.
The team believes that 125 hours of learner effort are required by learners to achieve the MIMLOs and justify the award of 5 ECTS credits at this stage of the programme.

Work-based learning and practice-placement

There is no work based learning or practice placement involved in the module.

E-learning

The college VLE is used to disseminate notes, advice, and online resources to support the learners. The learners are also given access to Lynda.com as a resource for reference.

Module physical resource requirements

Requirements are for a classroom for 60 learners equipped with a projector, and a space to allow the facilitation of group work through movable furniture.

Reading lists and other information resources

Recommended Text

Valacich, J. S., George, J. F. and Hoffer, J. A. (2015) *Essentials of Systems Analysis and Design*. Harlow: Pearson Education.

Secondary Reading

Kendall, K. E. and Kendall, J. E. (2013) *Systems Analysis and Design*. Upper Saddle River: Pearson.

Specifications for module staffing requirements

For each instance of the module, one lecturer qualified to at least Bachelor of Science (Honours) in Computer Science or equivalent, and with a Certificate in Training and Education (30 ECTS at level 9 on the NFQ) or equivalent.with a Certificate in Training and Education (30 ECTS at level 9 on the NFQ) or equivalent.. Industry experience would be a benefit but is not a requirement.

Learners also benefit from the support of the programme Director, programme administrator, learner representative and the Student Union and Counselling Service.

Module Assessment Strategy

The assignments constitute the overall grade achieved, and are based on each individual learner's work. The continuous assessments provide for ongoing feedback to the learner and relates to the module curriculum.

No.	Description	MIMLOs	Weighting
1	Series of tutorials	1-6	20%
2	Class test	1, 2, 3, 6,	20%
3	Take home assignment	4, 5	20%
4	Written exam that tests the theoretical aspects of the module	1-6	40%

All repeat work is capped at 40%.

Sample assessment materials

Note: All assignment briefs are subject to change in order to maintain current content.

GRIFFITH COLLEGE

ASSIGNMENT TITLE SHEET

Course:	HCC/BSCO/BSCH
Stage/Year:	1
Module:	Systems Analysis and Design 1
Semester:	Semester I
Assignment Number:	1
Date of Title Issue:	XX/XX/XX
Assignment Deadline:	XX/XX/XX
Assignment Submission:	Upload the completed assignment in .pdf format to Moodle
Assignment Weighting:	**20**

Assignment Title

Please state the assignment title / brief. Please specify details:

Weekly Tutorial Questions.

Learning Outcomes

Please state the programme and related module learning outcomes that this assignment is assessing.

1. Compare types of information systems and their uses in a business context

2. Discuss the concepts in the system development life cycle

3. Identify problems and organize requirements of an information system in an organisational context

4. Carry out a feasibility study for a proposed IT solution to a defined a business problem

5. Develop a project scope, and project plan based on effective feasibility analysis

    Explain effective requirement gathering and risk management techniques to project development

Assessment Criteria

Please state the assessment criteria applied to this assignment, such as:

- Development and retention of knowledge and skills in the area of Systems Analysis and design
- Demonstrate students understanding of the insights into projects, systems design, Analysis and Implementation

Systems Analysis and Design 1:

Tutorial 1- Introduction to Systems

All Questions to be attempted

Q1 Explain the difference between data and information. Give two examples

Q2 Define the following terms
1. Information System
2. Information Technology

Q3 The quality of systems is often decided by weighing up several factors. Outline and discuss five of these factors

Q4 Discuss the following types of information systems
1. Transaction processing systems
2. Business-to-business systems
3. Business-to-customer systems
4. Business intelligence systems
5. Artificial Intelligence systems and robotics

Q5 Porter's work can be used to identify a number of ways in which BIS can used to achieve competitive advantage. Discuss

Systems Analysis and Design 1:

Tutorial 2 – Management of Projects

All Questions to be attempted

Q1 Discuss each of the phases and stages of a project.

Q2 Outline the key elements of project management

Q3 Outline why do projects fail

Q4 Explain the difference between portraying a project plan as a Gantt chart and as a PERT chart?

Q5 What is the difference between elapsed time and effort time.

Q6 Outline and define the main activities involved with project initiation. Illustrate the main activities using a diagram

Systems Analysis and Design 1:

Tutorial 3 – Requirements Gathering

All Questions to be attempted

Q1 Define Requirements

Q2 Requirements fall into two broad categories: Functional (or behavioural) and non-functinal. Define and explain both categories using examples

Q3 The following Fact finding techniques may be used at the analysis stage.
- Questionnaires
- Interviews
- Observations
- Documentation review
- Brainstorming

Show your understanding of each technique mentioned above briefly

Q4 Identify and describe the sources of requirement categories

Q5 "Managing requirements is as crucial to system development as it gathering requirements itself" What are the main tasks to be performed to ensure success in requirements management

Q6 Explain the difference between requirements discovery and requirements gathering. Provide an example that clarifies the distinction between the two.

Q7 Discuss the difference between interactive methods and unobtrusive methods of information gathering.

Q8 In your opinion, when is the best time to gather requirements about a product.

Systems Analysis and Design 1:

Tutorial 4 – Systems Analysis

All Questions to be attempted

Q1 The following Fact finding techniques may be used at the analysis stage.
- Questionnaires
- Interviews
- Observations
- Documentation review
- Brainstorming

Outline the advantages and disadvantages of using each technique mentioned above

Q2 What are the main differences between an information flow diagram and a dataflow diagram

Q3 In an information flow diagram, why should one not record information flows that lie completely outside the system boundary.

Q4 What types of flow does context flow diagrams show

Q5 Discuss the relationships that can occur in Entity Relationship Diagrams using examples and diagrams to illustrate

Q6 Draw a diagram showing each of the following relationships on an ERD
   i.   The customer places many orders. Each order is received from one customer
   ii. The customer order may contain many requests for different products and each product may feature on many customer orders
   iii. Each customer has a single customer representative who is responsible for them. Each customer representative is responsible for many customers.

Tutorial 5 – Systems Design and Implementation

All Questions to be attempted

Q1 Define Systems Design

Q2 Discuss briefly the relationship and distinguishing factors between the Analysis and Design Stages

Q3 What are process modelling and data modelling? Which diagrams used to summarise requirements at the analysis phase are useful in each of these types of modelling.

Q4 Explain a structured design chart using a working example

Q5 What are the important factors to consider when designing a user interface

Q6 What is meant by the terms 'input design', 'output design' and 'database design' Illustrate each of them with an example.

Q7 What is the difference between unit testing and system testing

Q8 What is the difference between the Direct changeover method and the parallel changeover method?

Q9 What elements of staff training should a new system receive?

Q10 What is the purpose of a post-implementation review

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ASSIGNMENT TITLE SHEET

Course:	HCC/BSCO/BSCH
Stage/Year:	1
Module:	Systems Analysis and Design 1
Semester:	Semester I
Assignment Number:	2 – In-Class Test
Date of Title Issue:	XX/XX/XX
Assignment Deadline:	XX/XX/XX
Assignment Submission:	Upload the completed assignment in .pdf format to Moodle
Assignment Weighting:	**20**

Assignment Title

Please state the assignment title / brief. Please specify details:

In-Class Test.

Learning Outcomes

Please state the programme and related module learning outcomes that this assignment is assessing.

1. 1 Compare types of information systems and their uses in a business context

2. Discuss the concepts in the system development life cycle

3. Identify problems and organize requirements of an information system in an organisational context

Assessment Criteria

Please state the assessment criteria applied to this assignment, such as:

- Development and retention of knowledge and skills in the area of Systems Analysis and design
- Demonstrate students understanding of the insights into projects, systems design, Analysis and Implementation

Systems Analysis and Design: In-Class Test

Duration 1 hour

Attempt 4 out of 6 Questions – Each Carry Equal Marks

Q1
a) What is a successful Project? **(5 Marks)**
b) List and describe 4 areas project managers should be skilled in **(20 Marks)**

Q2
Define the traditional systems lifecycle and describe its advantages and disadvantages for systems building **(25 Marks)**

Q3
With reference to Customer Relationship Management (CRM systems) explain the function of these systems and examine the business benefit that can be achieved from using them **(25 Marks)**

Q4
a) Define what is meant by the Critical Path Method **(5 marks)**
b) Examining the Critical Path for the following activities

Activity	Immediately preceding activity	Duration (Weeks)
A	-	5
B	-	4
C	A	2
D	B	1
E	B	5
F	B	5
G	C, D	4
H	F	3
I	F	2

    i.   What are the paths through the network? **(10 Marks)**
   ii.   What is the critical path and its duration? **(10 Marks**)

Q5 In the system analysis phase of the SDLC, Data flow diagrams can be used. Explain the purpose of Data Flow Diagrams (DFDs) using an example. **(25 marks)**

Q6 The main stages in the implementation of new system can be outlined as follows: Installation, Testing, Staff Training, Conversion and Changeover

Discuss using examples each stage in the implementation of a new system
(25 Marks)

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ASSIGNMENT TITLE SHEET

Course:	HCC/BSCO/BSCH
Stage/Year:	1
Module:	Systems Analysis and Design 1
Semester:	Semester I
Assignment Number:	3
Date of Title Issue:	XX/XX/XX
Assignment Deadline:	XX/XX/XX
Assignment Submission:	Upload the completed assignment in .pdf format to Moodle
Assignment Weighting:	20%

Assignment Title

Please state the assignment title / brief. Please specify details:

You are been hired as a systems analyst for a small local company whose database system is outdated and staff have reverted to semi-manual systems. Currently customer details have been lost, orders have been delayed or have been completely missed as delivery people have gone to the wrong addresses with deliveries. The company has employed you to investigate the requirement and design of a system to meet these needs and overcome the problems.

Learning Outcomes

Please state the programme and related module learning outcomes that this assignment is assessing.

3. Identify problems and organize requirements of an information system in an organisational context

4. Carry out a feasibility study for a proposed IT solution to a defined a business problem

5. Develop a project scope, and project plan based on effective feasibility analysis

6. Explain effective requirement gathering and risk management techniques to project development

Assessment Criteria

Please state the assessment criteria applied to this assignment, such as:

- Presentation,
- analysis,
- critical thinking,
- originality,
- quality and thoroughness of the work,
- presentation, research,
- correct approach and
- treatment of sources.

1.0 Introduction

This assignment carries a weighting of 100%. For this assignment, address the areas outlined in section 4.0. A marking scheme for this assignment is also provided.

2. 0 Deliverables & Completion Date

Assignments should be uploaded in .pdf format using the link provided on Moodle. Name your assignment file according to your student number. Your file name should resemble the following example: 123456_johnx_assign2 where x is your second initial. Do not email assignments. The assignment should also show your name and student number clearly on the title page. Include a signed and dated assignment submission sheet (.pdf format) as the first page of your assignment. Faculty policy will apply to late assignments.

3.0 Referencing

Original work that shows your ability to think and analyse concepts is highly valued. The material presented, must be your own work. All other work must be fully and properly referenced. Harvard Referencing Techniques to be used - Poorly referenced work will not achieve high marks.

4.0 Assignment Details

As outlined above You are been hired as a systems analyst for a small local company that you are familiar with locally whose database system is outdated and staff have reverted to semi-manual systems. Currently customer details have been lost, orders have been delayed or have been completely missed as delivery people have gone to the wrong addresses with deliveries, etc. The company has employed you to investigate the requirements and design stages of a system to meet these needs.

Firstly, you should draw up a project plan using MS Project to show the Company Director how you are going to approach this task.

Next you need to prepare a typed report. This report upon completion will be presented via powerpoint to members of the company board and should be well presented. Details to include are outlined in the table below:

Gantt Chart	
Create a Gantt chart in MS Project	**10**
Create a Gantt chart for the project outlining each of the tasks to be carried out. The chart should include: Milestones, Dependencies, Multiple resources, Subtasks, Realistic times for all tasks.	
Statement of Scope & Objectives	
Assignment Scope	**15**
1. Name of Company or Organization, address, line of business, company contact, contact's phone number, and contact's e-mail address 2. A description of how the project was initiated (and by whom) 3. A brief description of the problem/opportunity to be investigated 4. Anticipated business benefits 5. System capabilities and description of any constraints that the project may have	
Company Information	**5**
1. Indication of company size, geographical locations 2. Personnel (by type) 3. An organization chart for the part of the organization you are studying 4. Business transaction types and monthly volumes	
Objectives	**5**
Identify 2 or 3 clear and measurable objectives for your proposed system Explain how these are relevant to the business strategy of the firm.	
Report Outline etc.	**35**
Incorporating the three main areas of feasibility, compile a feasibility report for your proposed system taking into account the Technical, Economic and Operational Feasibility Your report should also include a brief synopsis of the current system, the options available and the recommended option. It should show your ability to carry out a structured analysis of the proposed system using development tools and techniques.	
Presentation – preparation and presentation of Powerpoint Presentation of your report	**10**
Overall Report & Presentation	
Spelling (5 marks for no spelling / grammatical errors, 4 for 1 error, 3 for 2 errors...)	**5**
Automatic Table of Contents, Page Numbering, Heading page, clear points used (rather than vague paragraphs), Numbering of sections	**5**
Bibliography (i.e. comprehensive bibliography of books, articles and websites that were utilised to compile the document)	**5**
Extra material…	**5**
Outline of research methods used / Appendix that provides extra background information on the firm / Extra background information on options available / This is an opportunity to provide the company board with better information so that the decision they make is better informed.	

GRIFFITH COLLEGE DUBLIN

QUALITY AND QUALIFICATIONS IRELAND

EXAMINATION

SYSTEMS ANALYSIS & DESIGN 1

Lecturer:

External Examiner:

Date: XX/XX/XX   **Time: XX.XX**

THIS PAPER CONSISTS OF FIVE QUESTIONS
FOUR QUESTIONS TO BE ATTEMPTED
ALL QUESTIONS CARRY EQUAL MARKS

QUESTION 1

With the use of a diagram explain the difference between a Management Information Systems and a Transaction Processing Systems.

(10 marks)

(a)   Decision Support Systems (**DSS**) are an integral part of an organisations IT strategy.

     (i)   List and briefly explain **two** reasons for the continuing growth of decision-making information systems?

(3 marks)

     (ii)   Outline the main reason that Decision Support Systems (**DSS**) use models to work.

(2 marks)

(b)   Describe **four** of the characteristics of an Executive Information System?

(10 marks)

Total (25 marks)

QUESTION 2

(a)   Copy the network chart below and complete it.

(9 marks)

(b)   Identify the **project duration.**

(1 marks)

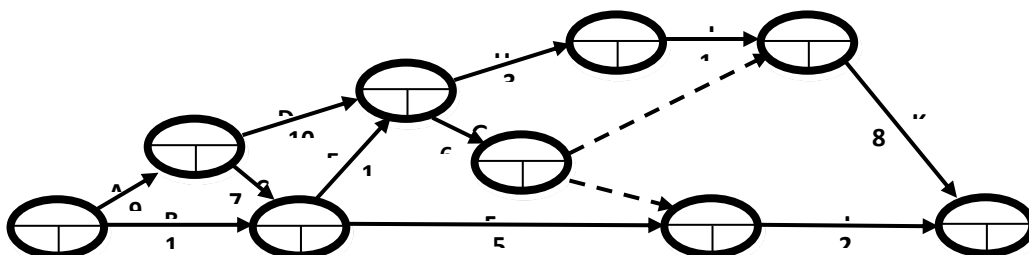(c)   Identify the **total float** for each activity.

(9 marks)

(d)   Identify the **Critical Path.**

(1 marks)

(e)   Construct a **GANTT** chart for the project, (including slack time for each activity).

(5 marks)

all times are in days

QUESTION 3

(a)   During the course we discussed a 6 stage Waterfall Model of the **Systems Development Life Cycle (SDLC).** With the aid of a diagram briefly describe the activities undertaken in each stage.

(12 marks)

(b)   Identify and describe **three** disadvantages of the Waterfall Model of the SDLC.

(6 marks)

(c)   Alternative SDLC models exist which seek to address the disadvantages of the Waterfall Model.   Explain how **prototyping** models overcome these disadvantages.

(3 marks)

(d)   With the use of examples indicate the criteria for deciding whether to use the waterfall model or a   prototyping model for systems development.

(4 marks)

Total (25 marks)

QUESTION 4

Design of interactions with users is of primary importance for of any system.

(i)   Explain the major differences between an **interactive** and **batch** environment.

(4 marks)

(ii)   Explain why **input design** is seen as important.

(5 marks)

(a)   The following documentation has been received from the project systems analyst:

Product Distribution

A national manufacturer of convenience foods distributes its products by truck to grocery stores, supermarkets, and convenience stores throughout the country. Over 500 drivers fan out from 10 distribution centres across the country each day, delivering over 100 different products to customers.

There is considerable variety in the size of customer operations and in the sale of products. In some stores one type of product may sell well and another may sell only very slowly. A different location may have just the opposite results. Since the products have a limited shelf life, freshness is an important consideration from the beginning of the manufacturing process to delivery to the store shelves. Thus, it is important for sales information to be accurately and quickly transmitted from the supermarket to the manufacturing facilities. Mistakes or delays show up in lost

sales and in improper production levels. Also, losses sometimes occur because of over- production.

Because of the large number of products, the order form used by the company is long and complicated. The form's complexity only adds to the possibility of mistakes and is thus disliked by drivers and store managers alike. The paperwork is excessive at the company's headquarters. When order forms reach the headquarters, order details are keyed into the company's large computer system. Almost 50 data entry operators are employed just to perform this work, since the information they enter is important for planning and scheduling of manufacturing and for determining what each customer is selling.

The system is widely regarded as flawed and has been selected as being ripe for re-development.

Another approach has been proposed. Several corporate managers and a senior systems analyst have been meeting to discuss the idea of replacing the widely used paper order form with hand-held computers.

Under the new system, the 50 route drivers would each be given a hand-held computer and a computerised printer would be installed in each truck. The driver, who is actually a route salesperson, would take the computer into the store and enter the details of what items and quantities are needed to restock the shelves of the particular customer. Back at the truck, the order information would be printed out on the spot and the items could be removed from the truck and placed on the customer's shelves. The ordering information from each of the fifty or so stops each driver makes during a single day would be retained in the memory of the hand-held computer throughout the day. The identity of each customer would also be retained. At the end of the day, the driver would connect the hand-held computer to a communications line, transmitting the day's business to headquarters for processing.

The project team wishes to evaluate this application for developing a prototype of the system. They want to see what the systems design function needs before initiating a prototyping type project, and have requested the following information from you:

(i)   Explain the benefits you believe will accrue from using the prototyping development method.

(4 marks)

(ii)   Describe and explain the features you believe should be included in a prototype of this system.

(4 marks)

(iii)   Outline information you require before starting the prototyping effort.

(4 marks)

(iv)   Discuss who should participate in the prototyping.

(4 marks)

Total (25 marks)

QUESTION 5

(a)   Explain the three important principles of software testing.

(6 marks)

(b)   Performance testing is a term that has many interpretations depending on the organisation involved. Explain **four** type of performance testing.

(10 marks)

(c)   User Acceptance Testing, (UAT), is generally undertaken when the development claim the system is ready for implementation. Explain **User Acceptance Testing**.

(5 marks)

(d)   Outline the reasons for undertaking **User Acceptance Testing**.

(4 marks)

Total (25 marks)