System Analysis and Design
SAND6221/d/p
MODULE OUTLINE 2024
(First Edition: 2016)

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Introduction

These days, you cannot imagine a world without computers, and certainly not a business world without information technology. For you, as a learner pursuing a career as a systems analyst or any other position involved in the design and development of information systems, it is necessary to learn about the newest developments in information systems, systems analysis and design concepts, the systems development life cycle and various system development tools and techniques. One of the most outstanding developments in the field of software engineering is Object Oriented Programming (OOP). Although this module is not a programming course, you will be introduced to the methodology of OOP and especially to the documentation and design of software systems using Unified Modelling Language (UML).

Using this Module Outline

This module outline has been developed to **support your learning**. Please note that the content of this module is on Learn as well as in the prescribed material. You will not succeed in this module if you focus on this document alone.

- This document does not reflect all the content on Learn, the links to different resources, nor the specific instructions for the group and individual activities.
- Your lecturer will decide when activities are available/open for submission and when these submissions or contributions are due. Ensure that you take note of announcements made during lectures and/or posted within Learn in this regard.

This Module on Learn

Learn is an online space, designed to support and maximise your learning actively. Its main purpose is to **guide and pace** you through the module. In addition to the information provided in this document, you will find the following when you access Learn:

- A list of prescribed material;
- A variety of additional online resources (articles, videos, audio, interactive graphics, etc.) in each learning unit that will further help to explain theoretical concepts;
- Critical questions to guide you through the module's objectives;
- Collaborative and individual activities (all of which are gradable) with time-on-task estimates to assist you in managing your time around these;
- Revision questions, or references to revision questions, after each learning unit.

Kindly note:
- Unless you are completing this as a distance module, Learn does **not** replace your contact time with your lecturers and/or tutors.
- SAND6221 is a Learn module, and as such, you are required to engage extensively with the content on the Learn platform. Effective use of this tool will provide you with opportunities to discuss, debate, and consolidate your understanding of the content presented in this module.
- You are expected to work through the learning units on Learn in your own time – especially before class. Any contact sessions will therefore be used to raise and address any questions or interesting points with your lecturer, and **not** to cover every aspect of this module.
- Your lecturer will communicate **submission dates** for specific activities in class and/or on Learn.

Icons Used in this Document and on Learn

The following icons are used in all your modules on Learn:

Icon	Description
Objectives	A list of what you should be able to do after working through the learning unit.
Prescribed Work	Specific references to sections in the prescribed work.
ThinkAbout	Questions to help you recognise or think about theoretical concepts to be covered.
Active Learning	Sections where you get to grapple with the content/ theory. This is mainly presented in the form of questions which focus your attention and are aimed at helping you to understand the content better. You will be presented with online resources to work through (in addition to the textbook or manual references) and find some of the answers to the questions posed.
Connect the dots	Opportunities to make connections between different chunks of theory in the module or to real life.
That is life!	Real life or the world of work information or examples of application of theory, using online resources for self-exploration.

REMEMBER:

You need to log onto Learn to:
• Access online resources such as articles, interactive graphics, explanations, video clips, etc. which will assist you in mastering the content; and
• View instructions and submit or post your contributions to individual or group activities which are managed and tracked on Learn.

Module Resources

Prescribed Material (PM) for this Module	Satzinger, JW, Jackson, RB, and Burd, SD. 2016. Introduction to Systems Analysis and Design: An Agile, iterative approach. 7th edition. 978130511720. Toronto. Cengage.
Recommended Readings, Digital, and Web Resources	Please note that several additional resources and links to resources are provided throughout this module on the Learn platform. You are encouraged to engage with these as they will assist you in mastering the various objectives of this module. They may also be useful resources for completing any assignments. You will not, however, be assessed under examination conditions on any additional or recommended reading material. The Importance of Requirements Definition in IT Systems Development by Ray Phariss; IS 6840, Systems Analysis; November 29, 2006, at http://www.umsl.edu/~sauterv/analysis/f06Papers/Phariss/ Watch this video to learn about system analysis and modelling in a 10-minute lecture https://www.youtube.com/watch?v=rBUfZ4t2FNo
Module Overview	You will find an overview of this module on Learn under the *Module Information* link in the Course Menu.
Assessments	Find more information on this module's assessments in this document and on the Student Portal.

Module Purpose

The purpose of this module is to focus on the analysis of systems in business, with the objective to improve enhance or evaluate such systems. The SDLC (Systems Development Life Cycle) and Object-Oriented principles form the basis of this module and students are taught to consider various important aspects of systems design in terms of requirements, static and dynamic modules, and user interfaces.

Module Outcomes

MO1	Demonstrate knowledge and understanding of the Systems Development Life Cycle (SDLC) and its models.
MO2	Identify object-oriented principles for system development.
MO3	Demonstrate knowledge and understanding of major components and levels of design.
MO4	Design and document software systems using Unified Modelling Language (UML).
MO5	Analyse alternatives to refine system definitions to ensure success.
MO6	Create and demonstrate an understanding of static and dynamic models.

Assessments

Integrated Curriculum Engagement (ICE)	
Minimum number of ICE activities to complete	4
Weighting towards the final module mark	10%

Assignments/ Projects	Assignment 1
Weighting	25%
Duration	10 hours
Learning Units	1-2
Resources required	Microsoft Office 2016

Assignments/ Projects	Assignment 2
Weighting	30%
Duration	10 hours
Learning Units	1-4
Resources required	Microsoft Office 2016

Examination	Examination
Weighting	35%
Duration	2 Hours
Total marks	120
Learning Units covered	All Learning units
Period	

Assessment Preparation Guidelines

	Format of the Assessment *(The Focus/ Approach/ Objectives)*	Preparation Hints *(How to Prepare, Resources to Use, etc.)*
Assignment 1 and 2	This assignment will challenge you to do some independent reading and research and should give you a good idea as to which concepts you still struggle with. This assignment will focus strongly on the application of certain concepts by providing you with tasks related to a case study.	Ensure that you understand what each question requires of you before you attempt the assignment. Challenge yourself to think outside the box.
Written Examination	The examination will assess all learning units and their associated outcomes. Questions will be theory-based and will consist of a variety of formats, such as Match-the-Column questions, short questions, and paragraph questions. You might also be required to interpret or draw certain diagrams.	To prepare effectively for this examination you can include the following in your preparation: • Ensure that you work through all the review questions in the LUs assessed. • Check if you are confident that you can answer questions relating to all of the Learning Objectives for the LUs tested. • Ensure that you understand the underlying principles of each diagram. • Work through Mock Assessments or previous assessments.

Module Pacer			
Code	Programme	Contact Sessions	Credits
SAND6221	BCA2; BCIS2; DIS2; DMT2 BIB1; BIS2	48	15
SAND6221p	DMT2d, BIB1p	36	
SAND6221d	BIB1d	24 + 12 Learn	
Learning Unit 1	An Introduction to System Development		

Overview:

In this learning unit, we will begin our exploration of system development by looking at the purpose of system analysis and design. We will examine the core processes of the Systems Development Life Cycle (SDLC) including the key diagrams used in system analysis and design. We will then explore use cases and the characteristics of iterative systems development, ending with an overview of the key documents used in project planning.

Please work through Themes 1, and 2 on Learn, together with the relevant sections of your prescribed source/s. To ensure that you are working towards mastering the objectives for this learning unit, please also ensure that you complete the Learning Unit 1 activities on Learn.

Learning Unit 1: Theme Breakdown		
SAND6211 SAND6211d Sessions: 1-7	Theme 1: Software Development and Systems Analysis and Design	Prescribed Material (PM)
Academic Week: 1-2 Related Outcomes: MO001	LO1: Describe the purpose of system analysis and design in the development of information systems; LO2: Describe the characteristics of iterative system development.	PM: Chapter 1
	Theme 2: System Development Life Cycle	PM: Chapter 1
	LO3: Explain the core processes of the System Development Life Cycle (SDLC); LO4: Identify key documents used when planning a project; LO5: Identify key diagrams used in systems analysis and design; LO6: Explain the utility of identifying use cases in system development; LO7: Explain the utility of identifying object classes in system development.	

Learning Unit 2	Systems Analysis

Overview:

In this learning unit, we will take a closer look at the activities associated with systems analysis, beginning with the differences between functional and non-functional requirements, the role of models and the development of activity diagrams. We will then examine the application of several techniques including user goal, event decomposition and CRUD techniques. We will explore how the concept of 'things' in the problem domain also defines requirements, including the interpretation and creation of entity relationships and domain model class diagrams. We will end the learning unit with a look at ways in which to develop use case descriptions, and system sequence and state machine diagrams.

Please work through Themes 1, 2, 3, and 4 on Learn, together with the relevant sections of your prescribed source/s. To ensure that you are working towards mastering the objectives for this learning unit, please complete the Learning Unit 2 activities on Learn.

Learning Unit 2: Theme Breakdown		
SAND6211 SAND6211d Sessions: 8-21	Theme 1: Investigating System Requirements	Prescribed Material (PM)
Academic Week: 3-5	LO1: Describe the activities of systems analysis; LO:2 Explain the difference between functional and non-functional requirements; LO3: Identify and understand different kinds of stakeholders and contributions to requirements definition; LO4: Describe the role of models and UML in systems analysis. LO5: Develop UML activity diagrams to model activity workflows;	PM: Chapter 2
Related Outcomes: MO001 MO004 MO005	Theme 2: Use Cases LO6: Apply the user goal technique to identify use cases; LO7: Apply the event decomposition technique to identify use cases;	PM: Chapter 3
	Theme 3: Domain Modelling LO8: Explain how the concept of 'things' in the problem domain defines requirements; LO9: Interpret and create an entity-relationship diagram; LO10: Interpret and create a domain model class diagram;	PM: Chapter 4
	Theme 4: Use case Modelling LO11: Develop use case descriptions; LO12: Develop system sequence diagrams and activity diagrams; LO13: Apply the CRUD technique to validate and refine the list of use cases.	PM: Chapter 5

Learning Unit 3	Systems Design

Overview:

In this learning unit, we will examine the differences between systems analysis and systems design, including the major design activities. Next, we will look at the creation of storyboards to show the sequence of forms used in a dialogue. Major hardware and network environment options, differences between user and system interfaces, and the historical development of the field of human-computer interaction (HCI) will be addressed next. We will end the unit by exploring the impact of visibility and affordance on usability as well as the design of printed and on-screen reports.

Please work through Themes 1, and 2 on Learn, together with the relevant sections of your prescribed source/s. To ensure that you are working towards mastering the objectives for this learning unit, please complete the learning unit 3 activities on Learn.

Learning Unit 3: Theme Breakdown		
SAND6211 SAND6211d Sessions: 22-28	Theme 1: Foundations for System Design	Prescribed Material (PM)
Academic Week: 6-7	LO1: Describe the differences between systems analysis and design; LO2: Explain each major design activity; LO3: Describe security methods and controls. LO4: Describe the system environment.	PM: Chapters 6 and 7
Related Outcomes: MO001 MO003	Theme 2: Designing the User and System Interfaces LO5: Explain the concepts of user interface, User Experience and Usability; LO6: Discuss the historical development of the field of human-computer interaction; LO7: Discuss the impact of visibility and affordance on usability; LO8: Design larger application components based on use cases and other analysis models.	PM: Chapter 8

Learning Unit 4	Projects and Project Management

Overview:

In this learning unit, we will examine the underlying assumptions and uses of a predictive and an adaptive system development life cycle (SDLC), including the role of the SDLC, models, tools and techniques in system development methodology. Next, we will look at Agile development, factors that impact the success of software development projects as well as knowledge areas in the project management body of knowledge (PMBOK). Finally, we will explore the Agile approach to the project management knowledge areas including the activities required for project approval and to plan and monitor a project.

Please work through Themes 1, and 2 on Learn, together with the relevant sections of your prescribed source/s. To ensure that you are working towards mastering the objectives for this learning unit, please complete the learning unit 4 activities on Learn.

Learning Unit 4: Theme Breakdown		
SAND6211 SAND6211d Sessions: 29-35	Theme 1: Approaches to System Development	Prescribed Material (PM)
Academic Week: 8-9	LO1: Compare the underlying assumptions and uses of predictive and adaptive system development life cycles (SDLC); LO2: Describe a system development methodology; LO3: Describe the key features of Agile development;	PM: Chapter 10
Related Outcomes: MO001 MO006	Theme 2: Project Planning and Project Management LO4: Describe the knowledge areas in the project management body of knowledge (PMBOK); LO5: Describe the Agile approach to the project management knowledge areas; LO6: Discuss the activities required for approval of a project (Core Process 1); LO7: Discuss the activities required to plan and monitor a project (Core Process 2).	PM: Chapter 11

Learning Unit 5	Advanced Design and Development Concepts

Overview:

In this learning unit, we will look at the purpose and objects of object-oriented design including the development of both unified modelling language (UML) components diagrams and design class diagrams. Next, we will examine the use of cyclic redundancy check (CRC) cards to define class responsibilities and collaborations, and the design of relational database schema. We will also explore the need for evaluation and improvement of a database schema followed by architectural models for distributed systems, and the importance of integrity controls for inputs, outputs, data, and processing. This will include the use of various software tests and the roles of configuration and change management, as well as source code control in the implementation, testing, and deployment of a system. We will end the learning unit by examining various approaches to data conversion and system deployment.

Please work through Themes 1, 2, and 3 on Learn, together with the relevant sections of your prescribed source/s. To ensure that you are working towards mastering the objectives for this learning unit, please complete the learning unit 5 activities on Learn:

Learning Unit 5: Theme Breakdown		
SAND6211 SAND6211d Sessions: 36-47	Theme 1: Object-Oriented Design: Use Case Realisation	Prescribed Material (PM)
Academic Week: 10-12	LO1: Explain the purpose and objects of object-oriented design; LO2: Develop a UML components diagram; LO3: Develop design class diagrams; LO4: Define class responsibilities and collaborations using CRC cards.	PM: Chapter 12
Related Outcomes: MO001 MO002 MO004 MO005 MO006	Theme 2: Designing Database LO5: Design a relational database schema based on a class diagram; LO6: Evaluate a database schema; LO7: Describe the different architectural models for distributed systems; LO8: Determine when and how to design the database. LO9: Explain the importance of integrity controls for inputs, outputs, data, and processing;	PM: Chapter 9
	Theme 3: Building the System Operations LO10: Discuss various types of software tests; LO11: Discuss the advantages of various approaches to data conversion and system deployment. LO12: Explain the role of configuration change management, and source code control for the implementation, testing, and deployment of a system;	PM: Chapter 14