Title (Units): **COMP3006 Software Engineering (3,2,1)**

Course Aims: This course introduces the methodology of software development as well as the organization, planning and management of the development process so that students will appreciate the difficulties involved in large system development projects and the importance of a disciplined approach to the problem. At the end of the study of this course, students should be able to

i) conduct a feasibility study,
ii) know how to conduct requirements analysis,
iii) conduct systems design to meet the systems requirements,
iv) develop testing plans, and
v) implement a system according to systems design specifications for software development projects.

Prerequisite: COMP2015 Data Structures and Algorithms

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe the fundamental elements of system development process
2	Explain how to apply a structured systems analysis and design methodology to analyze, design and document a software system
3	Explain the basic concepts of system implementation and support
	Professional Skill
4	Build a software system through a complete system development life cycle and manage a project in group
5	Produce a complete technical project report with all stages of a project documented, and make effective oral presentation and demonstration for the project
	Attitude
6	Exhibit professional attitude towards the development of a software system

Calendar Description: This course discusses principles and practical aspects of software development.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-3	Students will learn the concepts via lectures and in-class exercises.
4-6	Students will be assigned projects and assignments to improve their understanding in the material and to promote their skills and attitude Students.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Group Project	40%	4-6	The group project is designed to facilitate students working in a team environment to analyze, design and implement a software system. Students must obtain a satisfactory result for this Group Project in order to pass this course.
2	Examination	60%	1-3	Final examination questions are designed to evaluate how far students have achieved their intended outcomes. Questions will primarily be analysis and skills based to assess students' ability to apply system analysis and design techniques to software development.

Assessment Rubrics:

Excellent (A)	• Achieve the first five CILOs, demonstrating an excellent mastery of both the theoretical and practical aspects of the knowledge and skills in the selected topics • Able to develop correct solutions to problems in software engineering, accompanied by in-depth analysis and insight • Demonstrate a thorough understanding and solid knowledge of the principles and techniques of software engineering • Able to draw on a variety of techniques and relevant knowledge and appropriately apply them to new situations and real-life problems
Good (B)	• Achieve the first five CILOs, demonstrating a good understanding of the associated concepts and underlying methodologies in the selected topics • Able to develop correct solutions to problems in software engineering, accompanied by adequate explanations • Demonstrate a competent level of knowledge of the principles and techniques of software engineering • Ability to make use of appropriate techniques and knowledge and apply them to new situations and problems
Satisfactory (C)	• Achieve most of the first five CILOs, demonstrating a basic level of understanding of the associated concepts and underlying methodologies in the selected topics • Able to provide acceptable solutions to problems in software engineering • Demonstrate an adequate level of knowledge of the principles and techniques of software engineering • Ability to make use of some techniques and knowledge and apply them to familiar situations and problems
Marginal Pass (D)	• Achieve most of the first five CILOs, with minimal understanding of the associated concepts and underlying methodologies in the selected topics • Able to provide solutions to simple problems in software engineering • Demonstrate a basic level of knowledge of the principles and techniques of software engineering • Ability to apply some techniques and knowledge to a limited number of typical situations and problems
Fail (F)	• Achieve less than three of the first five CILOs, with little understanding of the associated concepts and underlying methodologies in the selected topics • Unable to provide solutions to simple problems in software engineering • Knowledge of the principles and techniques of software engineering falling below the basic minimum level • Unable to apply techniques or knowledge to familiar situations or problems

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Introduction to Systems Development	1,6
II	Requirements Analysis and Specification - Concepts	2,4,5
III	Systems Analysis -- Tools and Methods	2,4,5
IV	Systems Design Fundamentals	2,4,5
V	Design Approaches	2,4,5
VI	Systems Implementation and Validation	3,4,5
VII	Systems Support	3

References:

- R.S. Pressman, Software Engineering: A Practitioners Approach (8th Edition), McGraw Hill, 2014.
- L. D. Bentley and J. L. Whitten, System Analysis and Design for the Global Enterprise (7th Edition), McGraw-Hill, 2007.

- S.L. Pfleeger and J. M. Atlee, Software Engineering: Theory and Practice (4th Edition), Prentice Hall, 2009.
- I. Sommerville, Software Engineering (10th Edition), Pearson, 2015.
- Rod Stephens, Beginning Software Engineering, Wrox, 2015.
- Don Rosenberg and Matt Stephens, Use Case Driven Object Modeling with UMLTheory and Practice, Apress, 2009.
- B. Bruegge and A. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, (3rd Edition) Pearson, 2009.

Course Content:

<u>Topic</u>

I. Introduction to Systems Development
A. The systems life cycle
B. Players in the systems game
C. Project management
D. Automated tools for systems development

II. Requirements Analysis and Specification - Concepts
A. Requirements capture
B. Hardware and software issues
C. Feasibility and cost-benefit analysis
D. The system proposal

III. Systems Analysis -- Tools and Methods
A. Entity relationship diagrams
B. Data flow diagrams
C. Data dictionary
D. Process specifications
E. State transition diagrams
F. Object-oriented analysis

IV. Systems Design Fundamentals
A. Modular design concepts
B. Application architectural and modeling

V. Design Approaches
A. Prototyping
B. Database design
C. Input design
D. Output design
E. User interface design
F. Software design
G. Web-based design
H. Object-oriented design

VI. Systems Implementation and Validation
A. Programming languages and coding
B. Testing techniques and strategies

VII. Systems Support
A. Maintenance
B. Recovery
C. Enhancement and reengineering