Title (Units): **COMP3047 Software Engineering (4,2,3)**

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-scaled software 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 requirement analysis,
ii) conduct software design to meet the user requirements,
iii) develop testing plans, and
iv) implement a software solution according to the design specifications.

Prerequisite: COMP2045 Programming and Problem Solving AND
COMP2046 Problem Solving Using Object Oriented Approach

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 software development process.
2	Explain how to apply a disciplined methodology to analyze, design and document a software solution.
3	Explain the basic concepts of software implementation and testing.
	Professional Skill
4	Build a software solution through a complete software 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.
6	Develop hybrid mobile applications and dynamic web applications.

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

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-5	Students will learn the concepts via lectures and in-class exercises.
1-6	Students will be assigned projects and assignments to improve their understanding in the material and to promote their skills and attitudes.
4-6	Students will acquire knowledge and skills on software implementation via guided lab assignments and/or practical tests.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Software Design and Analysis Documentation	20%	4 - 5	Students will produce comprehensive documentation showcasing their ability to analyze requirements and develop effective software designs.
2	Software Development Project	30%	5 - 6	Students will design and implement a software system, demonstrating their understanding of software engineering principles and practices
3	Examination	50%	1-6	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 analysis and design techniques to software development.

Assessment Rubrics:

Excellent (A)	• Achieve all 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 • Excellent mastery of implementing software applications on different platforms
Good (B)	• Achieve all 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 • Good mastery of implementing software applications on different platforms
Satisfactory (C)	• Achieve most of the 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 • Acceptable mastery of implementing software applications on different platforms
Marginal Pass (D)	• Achieve most of the 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 • Some mastery of implementing software applications on different platforms
Fail (F)	• Achieve less than three of the six 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 • No mastery of implementing software applications on any platforms

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Project Planning and Requirement Gathering	1,2,4,5
II	Analysis and Design	2,4,5
III	Software Development and Programming Techniques	3,5-6
IV	Process Models	1-5

References:

- Rod Stephens, Beginning Software Engineering, Wrox, 2015.
- System Development guidelines from OGCIO - http://www.ogcio.gov.hk/en/infrastructure/methodology/system_development/
- Roger Pressman, Bruce Maxim, Software Engineering: A Practitioners Approach (8th Edition), McGraw Hill, 2014.
- Ian Sommerville, Software Engineering (10th Edition), Addison-Wesley, 2015.
- Jason. Appcelerator Titanium Smartphone App Development Cookbook - Second Edition. Packt Publishing, 2015.
- Radford, Stephen. Learning web development with Bootstrap and AngularJS: build your own web app with Bootstrap and AngularJS, utilizing the latest web technologies. Packt Publishing, 2015.
- Shahid, Shaikh. Sails.js essentials: get up to speed with Sails.js development with this fast-paced tutorial. Packt Publishing, 2016.
- Wilken, Jeremy, and Adam Bradley. Ionic in action: hybrid mobile apps with Ionic and AngularJS. Manning Publications, 2016.
- Jensen, Paul B. Cross-platform Desktop Applications with Node, Electron, and Nw.js. Manning Pubns Co, 2016.

Course Content:

<u>Topic</u>

I. Project Planning and Requirement Gathering
   A. Project management (PERT and Gantt charts)
   B. Documenting user requirement (e.g., user story and prototypes)

II. Analysis and Design
   A. Architecture and interface designs
   B. UML diagrams (structure, behavior and interaction diagrams)
   C. Object oriented design (inheritance and polymorphism)
   D. Database design

III. Software Development and Programming Techniques
   A. Graphical user interfaces for desktop application
   B. Dynamic web programming
   C. Hybrid mobile application development
   D. Source code management and tools

IV. Process Models
   A. Predictive models (e.g. waterfall)
   B. Iterative models
   C. Rapid application development models (e.g., agile)