Subject Description Form

Subject Code	COMP4442
Subject Title	Service and Cloud Computing
Credit Value	3
Level	4
Pre-requisite / Co-requisite / Exclusion	**Pre-requisite**: COMP2421 Computer Organization & COMP2432 Operating Systems, or equivalent subjects
Objectives	This is a fundamental course that provides students with the foundations of service and cloud computing, focusing on software development and applications. It covers the principles and concepts, the technical underpinnings and supporting technologies, and the best practices and applications. The objectives of this subject are to: 1. provide students with a broad view of the theoretical and technological aspects that has led to the evolution of service and cloud computing; 2. teach students how service and cloud computing supports different forms of functionality that are essential to the modern IT industry, and the requirements of working with cloud computing environments and develop cloud-based services and applications; 3. equip students with the underlying technologies of service and cloud computing including service-oriented architecture, cloud architecture and service models, virtualisation, and cloud management; and 4. equip students with the knowledge and skills for the planning, design and programming of cloud systems and software services for real-world applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) demonstrate in-depth understanding and appreciation of the technological impact of service and cloud computing for future enterprises, and the technologies underpinning it; (b) apply systematic and principled practices to designing, implementing and deploying service and cloud-oriented computing; (c) review and assess the risks, opportunities, costs and steps towards migrating existing systems to service and cloud computing; *Attributes for all-roundedness* (d) develop systematic and incremental approach to resolving practical enterprise computing problems and challenges;

	(e) demonstrate teamwork spirit and work effectively as a team member; and (f) write technical reports and present solutions.
Subject Synopsis/ Indicative Syllabus	**Topics:** **1. Overview** The evolution of computing paradigms; Motivations and benefits of service and cloud computing; Definitions and principles of service and cloud computing; Applications of cloud computing. **2. Cloud Architecture and Service Models** Cloud architecture and major components; Physical infrastructure; Service models; Service provisioning; **3. Service and Cloud Computing Technology Foundation** Key technologies behind service and cloud computing; Resource sharing, scalability, multi-tenancy, and heterogeneity; Virtualisation and Containerisation; Cloud computing and service-orientation; Web Services, SOA, Web 2.0; Services co-ordination and composition, MSA, Devops, Agile; SDN. **4. Cloud Service Providers and Platforms** Services and functions provided by cloud service providers; Representative providers and platforms (Amazon, Microsoft, IBM, Google, Alibaba, etc); AWS (EC2, S3, CloudFront, composite services, etc); **5. Cloud-based Application Development** Concepts and principles: common cloud use cases; types of cloud services; support for cloud application development; principles of building cloud-based applications. Methods and techniques: general procedure of cloud application development; paradigms of cloud applications (Web, Mobile, Content delivery, Event-driven, IoT, Big Data, Machine learning); Case study with AWS. **6. Cloud Management** Functionalities and requirements of cloud management; Core functions of cloud management; Platforms and tools for cloud management; Cloud security and data privacy.
Teaching/ Learning Methodology	The course is comprised of lectures, tutorials and laboratory exercises. During lectures, students are taught the important concepts and principles that drive the development of service computing, and how it connects to cloud. In the lecture, students are encouraged to actively participate in mini-discussions and questions that are designed to reinforce their understanding of concepts taught. During tutorials, students will be presented with real and practical scenarios of enterprise case studies. In particular, they will be given the unique opportunities to study, analyse and propose solutions that leverage service and cloud computing

concepts. Small group discussions will be encouraged and students will need to present their results and solutions in the form of reports and presentations.

To reinforce practical aspects of their training, simple lab exercises will be conducted to expose students to the state-of-the-art tools and development environment that uses service and cloud computing as the underlying architecture to provide enterprise solutions.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Continuous Assessments	**55%**	✓	✓	✓	✓	✓	✓
2. Final Examination	**45%**	✓	✓	✓	✓		
Total	100%						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Students taking the subject will be assessed by performance in two parts: continuous assessments and examination. Continuous assessment may include in-class discussions / quizzes, assignments, and tests.

The in-class discussions and quizzes engage students to actively participate in learning during lectures and tutorials. Students are to collaboratively work together to apply what they have learned in the class to solve practical problems. Assignment may include group projects that are designed to help students to work together in a small group to solve practical case studies and examples by applying concepts that are taught in the class. The results are to be presented in the form of reports and presentations. Tests and assignments are designed to help students reinforced their understanding of concepts and principles that are taught in the class. They are conducted to assess independent problem solving and critical thinking skills.

Student Study Effort Expected

Class contact:	
▪ Lectures, Tutorials / Labs	39 Hrs.
Other student study effort:	
▪ Assignments, Projects, Reading and Exam	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference Books:

1. Chellammal Surianarayanan and Pethuru Raj Chelliah, *Essentials of Cloud Computing*, Springer, 2019.

2. Arshdeep Bahga and Vijay Madisetti, *Cloud Computing Solutions Architect: A Hands-On Approach*, Arshdeep Bahga & Vijay Madisetti, 2019.

	3. Articles from web, technical journals, and conference proceedings will be handed out or posted on L@PU Blackboard when needed.