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|  | DEPARTMENT OF SOFTWARE ENGINEERING |
| FACULTY OF COMPUTING |

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| **MODULE OUTLINE** | | | | | | | | |
| Module Name | **Distributed Systems** | | | | | | | |
| Module Code | SE3020 | | Version No. | 2018 | | - | | 1 |
| Year/Level | 3 | | Semester | 1 | | | | |
| Credit Points | 4 | | | | | | | |
| Pre-requisites | None | | | | | | | |
| Co-requisites | None | | | | | | | |
| Methods of Delivery | | Lectures (Face-to-face)  Tutorials Labs | | | 2  1  2 | | Hours/Week  Hours/Week  Hours/Week | |
| Course Web Site  Lecturer in Charge | | <http://courseweb.sliit.lk/>  Dr. Dharshana Kasthurirathna ([dharshana.k@sliit.lk](mailto:dharshana.k@sliit.lk)) – 0117 544 140 | | | | | | |
| Date of Original Approval | | October, 2017 | | | | | | |
| Date of Next Review | | April, 2020 | | | | | | |

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|  | **MODULE DESCRIPTION** | | | | |
| Introduction | This module intends to familiarise students with the concepts and applications of Distributed Computing. Students will get an understanding on the importance of Distributed Computing as oppose to standalone systems, difference Distributed Computing systems, approaches and technologies. They will also gain an understanding on the situations and problems where Distributed Computing may be applied and the possible challenges involved with developing Distributed Systems. | | | | |
| Learning  Outcomes | At the end of the module student will be able to: | | | | |
| **LO1:** | Justify the necessity of Distributed Systems | | | |
| **LO2**: | Present core-concepts of Distributed Systems effectively | | | |
| **LO3**: | Design and implement Distributed Systems | | | |
|  | **LO4**:  **LO5**: | Identify and discuss the core challenges in developing Distributed systems and the ways to overcome them.  Develop arguments and make appropriate judgements on Distributed Systems with theories and concepts. | | | |
| Assessment  Criteria | During the semester, there will be 3 assessments and a final exam. The distribution of marks for the assessed components of the unit are as follows: | | | | |
| Continuous Assessments   * Assignment 1 * Assignment 2 * Lab Exercises | | 20  20  10 | %  %  % | LO1- LO3  LO3, LO4  LO1-LO6 |
| End Semester Assessment   * Final Examination | | 50 | % | LO1-LO6 |
| TOTAL | | 100 | % |  |
| Estimated Student Workload | Contact Hours | |  | | |
| * Lecture | | 26 hours | | |
| * Tutorial | | 13 hours | | |
| * Laboratory | | 26 hours | | |
| Time Allocated for Assessments | |  | | |
| * Continuous Assessments | | 03 hours | | |
| * Final Examination | | 02 hours | | |
| Reading and Independent Study | | Hours | | |
| TOTAL | | 200 hours | | |
| Module  Requirement | To pass this module, students need to obtain a pass mark in both “Continuous Assessments” and “End of the Semester Examination” components which would result in an overall mark that would qualify for a “C” grade or above | | | | |
| Primary References | Recommended Texts   1. Distributed Systems: Principles and Paradigms. Andrew S. Tanenbaum, Maarten van Steen 2. Distributed Systems: Concepts and Design. George Coulouris | | | | |
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| **CONTENTS OF THE MODULE** | |
| **Topic 1 - Introduction to Distributed Systems**   * Theoretical Concepts of Distributed Systems * Distributed System patterns (Hub and Spoke model) | LO1, LO2, LO4 |
| **Topic 2 – Distributed System Architectures**   * Software Architectures * System Architectures | LO1, LO2, LO4, LO5 |
| **Topic 3 – Socket Programming**   * Inter-socket communication (Java and .Net) | LO3 |
| **Topic 4 –Remote Method Invocation(RMI) / Remote Procedure Calls(RPC) (LO2, LO3)**   * RMI implementation in Java / .Net (Lab Practical) * XML Serialization | LO3, LO4 |
| **Topic 5 – Asynchronous Communication**   * Callback functions * Asynchronous web * Messaging (Queues / Topics) | LO3, LO4 |
| **Topic 6 – Distributed Component Frameworks**   * CORBA * Introduction to J2EE Framework | LO3, LO4, LO5 |
| **Topic 7 – Open Message Formats**   * XML * XML Schemas * JSON | LO3, LO4 |
| **Topic 8 - Web Services**   * Service Oriented Architecture (SOAP/ REST) , Resource Oriented Architecture applications for Distributed Systems. * Service integration * Securing web services * Microservices | LO3, LO4 |
| **Topic 9 -– Fault Tolerance and Load Balancing**   * Types of faults * Fault tolerance/Load balancing and Availability * Fault tolerance principles and techniques * Load balancing and availability * Different load balancing techniques | LO4, LO5 |
| **Topic 10 - Introduction to Cloud Computing**   * Justification of the cloud computing architecture * Cloud computing use cases * Cloud computing architectures | LO4, LO5 |
| **Topic 11 – Clock Synchronization**   * Global clocks * Vector clocks | LO1, LO4 |
| **Topic 12 – Peer to Peer computing** | LO3 |
| **GENERIC INFORMATION** |  |
| Any type of plagiarism is not allowed.    Plagiarism: Academic honesty is crucial to a student’s credibility and self-esteem, and ultimately reflects the values and morals of the Institute as whole. A student may work together with one or a group of students discussing assignment content, identifying relevant references, and debating issues relevant to the subject. Plagiarism occurs when the work of another person, or persons, is used and presented as one’s own.        --------------------------End of Module Outline-------------------------- |  |