Software Metrics

Course Code	:	**SE 3203**	**Credits**	:	**02**
Credit Hours	:	**02/week**	**Exam Hours**	:	**03**
Class	:	**Batch 01**			

Course Objective and Course Summary:

This purpose of this course is to provide the students with the following capabilities:
- The ability to define effective metrics for any software development situation
- To understand the factors and issues concerning software effort estimation
- The ability to successfully estimate the size of a software project
- The ability to simplify the design of the project in order to reduce the cost.
- The ability to successfully estimate/measure/predict the quality of a software project
- The ability to accurately track the progress of a software project
- The ability to understand basic financial measurements that relate to software projects

Total 28 hours of class lecture is needed to conduct this within 14 weeks.

Prerequisite Course/s:

- SE 1113 Introduction to Software Engineering
- SE 2112 Software Project Lab-I & SE 3112 Software Project Lab-II

Content of the Course:

Topic	Lesson Plan	Hrs
Introduction to Software Metrics	Measurement in Software Engineering, Scope of Software Metrics	1
Measurement Fundamentals	Measurement Theory, Measurement And Models, Measurement Scales, Measures of Central Tendency and Variability, Validity and Reliability of Measurement, Measurement Error, Limits of Software Metrics	2
Software Attributes	Software entities: Processes, Products, Resources; Attributes: Internal attributes, External attributes	2
Determining What To Measure	The Goal Question Metrics Approach, Decision Maker Model, Standards Driven Metrics	2
Measuring Size	Properties of Software Size; Code Size: Lines of Code; Design Size; Requirements Analysis and Specification Size; Functional Size Measures And Estimators: Function Points, COCOMO II Approach; Applications Of Size Measures: Using Size To Normalize Other Measurements, Size-based Reuse Measurement, Size-based Software Testing Measurement;	6

Measuring Structure	Aspects of Structural Measures: Structural Complexity Properties, Length Properties, Coupling Properties, Cohesion Properties; Control Flow Structure: Flowgraph Model And The Notion Of Structured Programs; Cyclomatic Complexity; Code Structure And Test Coverage Measures; Design-level Attributes: Models Of Modularity And Information Flow, Tree Impurity, Internal Reuse, Information Flow; Object-oriented Structural Attributes and Measures: Coupling, Cohesion, Length, Reuse;	8
Defects and Defect Metrics	Faults Versus Failures; Defect Dynamics and Behaviors; Defect Projection Techniques and Models; Additional Defect Benchmark Data; Cost Effectiveness of Defect Removal by Phase	2
Software Reliability Measurement and Prediction	Basics of Reliability Theory; Software Reliability Problem; Software Reliability Theory; Reliability Models; Failure Arrival Rates;	2
Response Time and Availability	Response Time Measurements; Availability: Factors, Software Aging, Complexities in Measuring Availability	1
Measuring Progress	Project Milestones; Code Integration; Testing Progress; Defects Discovery and Closure; Process Effectiveness;	1
Financial Measures for the Software Engineer	Financial Concepts; Building the Business Case: Costs, Benefits, Business Case Metrics;	1

Reference Books:

(1) Software Metrics: A Rigorous and Practical Approach, Third Edition
Norman Fenton and James Bieman

(2) Software Measurement and Estimation: A Practical Approach
Laird and Brennan, Wiley, 2006 ISBN 0-471-67622-5

(3) Software Estimation
McConnell, ISBN-10: 0735605351