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**FIRST SEMESTER 2020-2021**

# Course Handout

Date: 26-07-2021

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : **SS G515**

## Course Title : **Data Warehousing**

## Instructor-in-Charge : **Narasimha Bolloju**

**Description:** Introduction, evolution of data warehousing; decision support systems; goals, benefit, and challenges of data warehousing; architecture; data warehouse information flows; software and hardware requirements; approaches to data warehouse design; creating and maintaining a data warehouse; Online Analytical Processing (OLAP) and multi-dimensional data, multidimensional modeling; view materialization; data marts; data warehouse metadata; data mining.

**Scope and Objective of the Course:**

Decision makers require access to all the organization’s data, wherever it is located, in appropriate structure and detail that helps in their decision making. This course will involve an in-depth study of various concepts and techniques needed to design, develop, and maintain a data warehouse. The course also offers OLAP techniques and business intelligence tools for accessing data warehouses and data marts by the decision makers. This course has the following learning objectives:

* to understand concepts of data warehousing, role of data warehouses in provisioning strategic information to decision makers at various organizational levels,
* to gather and analyze requirements for building data warehouses by selecting a suitable data warehouse architecture and developing necessary dimensional models, and
* to apply suitable techniques for online analytical processing using business intelligence and tools.

**Textbooks:**

**T1.** Ponniah Paulraj, ***“Data Warehousing Fundamentals for IT Professionals”***, WSE, 2ed., 2010.

**T2.** Kimball Ralph & M Ross, ***“The Data Warehouse Toolkit”,*** WSE, 3rd ed., 2013.

**Reference books**

**R1.** Anahory S, & Dennis M, “***Data Warehousing in the Real World”***, Addison-Wesley, 2000.

**R2.** Kimball R, Reeves L, Ross M, & Thornthwaite, W, ***“The Data Warehouse Lifecycle Toolkit”,*** John Wiley, 1998.

**R3.** Adamson C, & Venerable M, “***Data Warehouse Design Solutions***”, John Wiley, 1998.

**R4.** Inmon, WH, ***“Building the Data Warehouse”***, John Wiley, 2002.

**Course Plan:**

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| **Lecture No.** | **Learning Objectives** | **Topics to be covered** | **Chapters in the textbook** |
| 1-12 | * To explain the need for data warehouses in organizations * To design a simple data warehouse using the dimensional modeling technique * To develop reports and dashboards on a populated data warehouse | * Introduction to data warehousing * Components of data warehouses * Processes for building data warehouses * Introduction to dimensional modeling * Introduction to reports and dashboards for business intelligence (BI) | T1: 1, 2  T2: 1, 2 |
| 13-18 | * To differentiate popular data warehouse architectures * To specify business requirements for data warehouse * To explain data warehouse development processes * To apply dimensional modeling technique for data warehouse design | * Popular architectures for data warehouses and data marts * Gathering and defining business requirements * Kimball’s DW/BI lifecycle * Principles of dimensional modeling (star schemas and data cubes) | T1: 4,6,7,10  T2: 2,18 |
| 19-24 | * To explain the role of metadata in data warehousing * To elaborate necessary processes and tasks associated with ETL * To explain mechanisms for ensuring data quality in data warehouses | * Metadata – need, common types and providing metadata * Extract-transform-load (ETL) – concepts, operational source systems, requirements, processes and tasks, data integration * Data quality challenges and techniques/tools for ensuring data quality | T1: 9, 12,13  T2: 19, 20 |
| 25-30 | * To explain online analytical processing * To apply dimensional analysis techniques * To elaborate differences among OLAP models * To differentiate among information delivery mechanisms | * Online analytical processing (OLAP) – need, major functions and feature * Dimensional analysis * OLAP models (MOLAP, ROLAP, HOLAP) * Types of information delivery mechanisms and supporting tools | T1: 14, 15  T2: 17 |
| 31-40 | * To explain advanced dimensional modeling and ETL techniques * To elaborate data warehouse performance enhancement methods * To explain the trends in data warehousing and BI | * Advanced dimensional modeling * Real time data warehouses * Advanced ETL techniques * Data warehousing trends and BI including Web-enabled data warehouses * Data warehouse physical design and performance enhancement techniques | T1: 3, 11, 16, 18, 20  T2: 1, 17, 19, 20 |

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| **Practical No.** | **Experiment Title** |
| 1 | Identifying strategic information needs for data warehousing |
| 2 | Designing and preparing analytical reports with a sample data mart |
| 3 | Developing enterprise bus matrix with relevant dimension tables for a data warehouse |
| 4 | Dimensional modeling with different dimension table types |
| 5 | Dimensional modeling with different fact table types |
| 6 | Designing and validating business intelligence reports |
| 7 | Selecting appropriate visualizations for the designed business intelligence reports |
| 8 | Connecting various elements of reports to corresponding elements in dimensional models |
| 9 | Populating data warehouse fact tables with data and validating the generating reports |
| 10 | Planning and verification of data staging for a given data warehouse |
| 11 | Developing dashboards for access via desktop and mobile devices |
| 12 | Practicing with advanced dimensional modeling techniques |

Note: During lab sessions (#5 to #11 above), the students are required to present assigned data warehousing case studies (from Textbook T2) and to present & demonstrate their team project work.

**Evaluation Scheme:**

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| --- | --- | --- | --- | --- |
| **Component** | **Duration** | **Weightage (%)** | **Date & Time** | **Nature of component** |
| Mid-semester test | 90 Minutes | 30 | As per the timetable | Open Book |
| Project work | NA | 15 | TBA | Open Book |
| Lab activities |  | 10 | TBA | Open Book |
| Presentations |  | 5 | TBA | Open Book |
| Comprehensive  Examination | 120 Minutes | 40 | 23/12 FN | Open Book |

***Note: Minimum 40% of the evaluation to be completed by midsem grading.***

**Consultation Hour:** Tuesdays 10 AM to noon (or by appointment)

**Notices:** All the notices and announcements concerning this course will be posted on **the course page on Google Classroom.**

**Make-up Policy:** For tests and comprehensive exam components, make-up policy is according to the institute regulations. For the other component (fourth in the table above), there will be no make-up.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**