Course: Data Warehousing and Business Intelligence

Semester: Summer (Odd Years)

Course Format
And Credit hours: online
3 hr Credit

Prerequisites: SENG 520, Experience with a high-level programming language

Instructor: Jeffrey T. Edgell,
(304) 579-7726, Jeff.Edgell@comcast.net

Schedule: Monday 6:00 to 8:30 p.m.

Book: The Data Warehouse Lifecycle Toolkit
Ralph Kimball, Laura Reeves, Margy Ross, and Warren Thornthwaite

Location: On Line

Office Hours: By appointment

Course Description

This course looks at data warehousing and business intelligence concepts and techniques. Data warehousing and BI has emerged as a concept that has aided numerous organizations in understanding their business and making proper judgments. Data warehousing emerged into industry in the early 1990’s, even though the concept has been widely known since the 70’s. Only recently have advances in technology made data warehousing a reality in industry.

The course will cover techniques for designing and building a data warehouse and BI platform. This will be accomplished through looking at current and effective techniques, practical application, and case study reviews.

During the course the student will be responsible for assigned readings, information presented during lectures, group and individual assignments and exercises, and class discussion. The student is expected to have a basic understanding of software engineering technique and terminology and database concepts.

Course Rationale

The course is an essential course in the software engineering curriculum and provides foundational skills required of all software engineers. Data Warehousing and Business Intelligence are critical in the contemporary IT workplace. Organizations rely heavily on the information obtained from within as well as outside to make both tactical and strategic decisions.
Those that can do it with the most precision and speed dominate the area of business or operation. This is often referred to as information superiority.

The demand on computer scientist and engineers that are fluent in the areas of data warehousing and business intelligence will be vital to organizations as long as data is collected. Thus, a treatment of the subject giving a student applied experience is essential and gives the student a proper base in the field and a strong capability to transfer the skills to the work environment.

The student will be exposed to a foundational data warehousing and business intelligence techniques and processes. This will include determining the need for a warehouse or BI platform, model identification and selection, star schema and bus architecture design, user application identification, and metadata design. At the completion of the class the successful student will have acquired the skills to apply appropriate tools and techniques in a defined context and be capable of successfully executing the these concepts in the real world.

These skills are absolutely essential to a software engineer and provide the foundation for the student to be successful in the real world.

**Expected Learning Outcomes:**

Upon successful completion of Data Warehousing and Business Intelligence, students will:

1. The student will be able to develop a plan to identify needs a properly staff for a data warehousing/BI project.
2. The student will be able to successfully execute the data warehouse litmus test.
3. The student will be able to understand, evaluate, and select technology utilized for data warehousing and BI.
4. The student will be able to conduct risk assessments and develop mitigation and contingency plans associated to a data warehousing and BI project.
5. The student will have the ability extra and document business a given process and translate it into a dimensional model.
6. The student will have the ability to develop a complex data warehouse design utilizing the bus architecture.
7. The student will have the ability to develop and execute a change control plan after baselining a data warehouse design.
8. The student will have the ability to select the most appropriate solution for slowly changing dimensions.
9. The student will have the ability to identify monster dimensions and produce solutions to enhance/improve query performance while maintaining referential data integrity.
10. The student will have the ability to identify and manage data warehouse operational, technical, and user metadata.
11. The student will have the ability to actively participate in and contribute to “real world” data warehouse and BI projects through direct classroom project experience.
12. The student will have the ability to design and construct aggregate tables to improve and enhance query performance.
13. The student will have the ability to identify and understand ROI factors associated to data
warehousing and BI projects.
14. The student will have the ability to differentiate between strategic and tactical knowledge in a business enterprise and develop appropriate models for each.
15. The student will have the ability to identify and design user business intelligence reports.

**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm</td>
<td>35 %</td>
</tr>
<tr>
<td>Final</td>
<td>45 %</td>
</tr>
<tr>
<td>Project and Assignments</td>
<td>20 %</td>
</tr>
<tr>
<td></td>
<td>100 %</td>
</tr>
</tbody>
</table>

**Grade Assignment:**

- 100 – 90 A
- 89 – 80 B
- 79 – 70 C
- 69 – 60 D
- 59 – 0 F

**Tests:**

All tests are designed to gauge the student’s understanding of topics covered in assigned reading, lectures, and homework assignments. A midterm and final will be given. The final will be comprehensive.

**Grading Policy:**

Make-up exams may be given under special circumstances. It is your responsibility to arrange for a make-up prior to the examination.

Assignments may be handed in late under special circumstances. It is the student’s responsibility to negotiate the terms of an extension to an assignment. Course policy is a reduction of 20% per class that the assignment is late.

**HW Assignments:**

Homework assignments will be given approximately every other week and each assignment will be used in the construction of the final project. The assignments will be used to emphasize lecture material and produce artifacts for a group project.

**Design Project:**

During this course, you are expected to work in a group of 2 or 5 students on a real world project to:

1. Define and document a business domain area to apply a data warehouse and BI techniques to.
2. Identify the analytical questions to be answered.
3. Develop the logical data model for the data warehouse (this will include at least three data marts).
4. Design the physical data model.
5. Construct a data dictionary indicating the source and target data, known business transformation rules, cleansing rules, frequency of loads, and the data aggregation rules to be applied.
6. Develop a high level definition of the architecture indicating how data will be distributed, the type of machines you will use, the user access capabilities, OLAP capabilities, etc.

You and your group members will be required to present the solutions in a formal oral presentation, in front of faculty and students, at an assigned time in the semester.

**Attendance Policy:** Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.
### Course Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignment 1</th>
<th>Assignment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Data Warehousing and Business Intelligence</td>
<td>Read Chapter 1 “Basic Elements of the Data Warehouse”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Introduction to the Lifecycle</td>
<td>Read Chapter 2 “The Business Dimensional Lifecycle”</td>
<td>Assignment 1: Form project teams and develop a proposed project statement to include a description of the business domain, current analytical methods, and proposed outcomes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Staying in Control</td>
<td>Read Chapter 3 “Project Planning and Management”</td>
<td>Assignment 1: <em>submitted for grading</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Understanding the Users Business Needs</td>
<td>Read Chapter 4 “Collecting the Requirements”</td>
<td>Assignment 2: Develop requirements elicitation plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The Dimensional Model: Focus on the Star Schema</td>
<td>Read Chapter 5 “A First Course in Dimensional Modeling”</td>
<td>Assignment 2: <em>submitted for grading</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The Dimensional Model: Focus on the Bus Architecture</td>
<td>Continued Reading Chapter 5 “A First Course in Dimensional Modeling”</td>
<td>Assignment 3: Identify and describe the proposed data marts based on findings from assignment 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>The Dimensional Model: Focus on Fact and Dimension Tables</td>
<td>Continued Reading Chapter 5 “A First Course in Dimensional Modeling”</td>
<td>Assignment 3: <em>submitted for grading</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Advanced Dimensional Modeling Techniques: Focus on Extended Table Design</td>
<td>Read Chapter 6 “A Graduate Course on Dimensional Modeling”</td>
<td>Midterm Exam Handed Out</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Advanced Dimensional Modeling Techniques: Focus on Advanced ROLAP Techniques</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Continued Reading Chapter 6 “A Graduate Course on Dimensional Modeling”

10 Constructing Models: Focus on the Design of the Tables
   Read Chapter 7 “Building the Dimensional Model”

11 Midterm Break

12 Constructing Models: Focus on Managing the Construction Process
   Continued Reading Chapter 7 “Building the Dimensional Model”

13 The Data Warehouse Architecture
   Read Chapter 8 “Introducing Data Warehouse Architecture”

14 The Back Room: Focus on Services
   Read Chapter 9 “The Back Room Technical Architecture”

15 The Back Room: Focus on Assets Managements
   Read Chapter 9 “The Back Room Technical Architecture”

16 Data Mining and Data Discovery
   Read Class Handouts
   Final Handed Out
   All Projects Due

17 Course Review
   Final submitted for grading