CS130T
Introduction to Databases
[Onsite]

Course Description:

This course introduces relational database concepts and the role of databases in both Windows and Web applications. The course introduces basic data modeling and normalization concepts. Extensible Markup Language (XML) is also introduced.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: TB133T Strategies for the Technical Professional or equivalent

Credit hours: 4

Contact hours: 60 (36 Theory Hours, 24 Lab Hours)

Syllabus: Introduction to Databases

Instructor:	_____
Office hours:	_____
Class hours:	_____

Major Instructional Areas

1. Role and importance of databases to applications.

2. Relational Database Management System (RDBMS) components and features.

3. Designing relational database models.

4. Creating Entity-Relationship Diagrams (ERDs).

5. Using normalization.

6. Retrieving and modifying data.

7. Designing and using XML documents.

8. Role of advanced database implementations.

Course Objectives

1. State the role of databases in application design.

2. Identify the importance of well-designed databases.

3. Identify the features and components of a Relational Database Management System (RDBMS).

4. Build relational database models using entities, attributes, keys, and relationships.

5. Create basic Entity-Relationship diagrams (ERDs).

6. Use normalization to improve database design.

7. Explain the role of data stores, data warehousing, data mining operations, and Online Analytic Processing (OLAP).

8. Use basic Structured Query Language (SQL) commands to view and modify data.

9. Identify key features of current relational database management systems.

10. Recognize and create well-formed XML documents.

11. Use XML elements, attributes, namespaces, data types, and schemas.

12. Navigate XML documents.

SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, created by the National Secretary of Labor in the early 1990s, created a list of skills and competencies that the committee feels are necessary for employees to function in a high-tech job market.

1. Acquire and evaluate information.

2. Use computers to process information.

3. Apply and adapt new knowledge and skills in both familiar and changing situations.

4. Demonstrate the ability to effectively and efficiently utilize the ITT Tech Virtual Library.

5. Select and analyze information and communicate the results.

6. Determine which set of procedures will produce the desired results and make clear recommendations including rationale.

7. Analyze system and develop new or alternative systems.

Course Outline

Note: All graded activities, except the Project, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Lab 1.5 refers to the fifth lab activity in Unit 1.

Unit	Activities
1– Database Fundamentals	• Content Covered: *Database Design and Development:* o Chapter 1, "The Role of Databases in Electronic Business" • Labs: 1.1 • Assignments: 1.1
2– Relational Theory and Design	• Read from *Database Design and Development:* o Chapter 2, "Relational Theory" o Chapter 3, "Conceptual Design" • Labs: 2.1 • Assignments: 2.1 • Course Project: Part 1
3– Normalization	• Read from *Database Design and Development:* o Chapter 4, "Normalization" • Labs: 3.1 • Assignments: 3.1 • Course Project: Part 2 • Quizzes: 3.1
4– SQL Language	• Read from *Database Concepts:* o Chapter 3, "Structured Query Language" • Labs: 4.1 • Assignments: 4.1 • Course Project Part 3 • Quizzes: 4.1
5– Microsoft SQL	• Read from *Database Concepts:* o Appendix A, "Getting Started with Microsoft SQL

Unit	Activities
Server and MySQL	Server 2005 Express Edition" o Appendix B, "Getting Started with MySQL" • Labs: 5.1 • Assignments: 5.1 • Course Project Part 4 • Quizzes: 5.1

6–
 	
Creating and Using Databases
	• Read from *Database Concepts:*
	
	    o Chapter 10, "Creating Databases with Microsoft SQL Server"
	
	    o Chapter 11, "Retrieving Data with SQL Server
	
	• Labs: 6.1
	
	• Assignments: 6.1
	
	• Course Project Part 5
	
	• Exam I

7–
 	
Advanced Database Concepts
	• Read from *Fundamentals of Database Systems:*
	
	    o Chapter 28, "Data Mining Concepts"
	
	    o Chapter 29, "Overview of Data Warehousing and OLAP"
	
	• Labs: 7.1
	
	• Assignments: 7.1
	
	• Quizzes: 7.1

8– XML Documents	• Read from *XML How to Program:* o Chapter 5, "Creating Markup with XML" • Labs: 8.1 • Assignments: 8.1 • Course Project Part 6

Unit	Activities
9– Document Type Definition (DTD) and Schemas	• Read from *XML How to Program:* o Chapter 6, "Document Type Definition (DTD)" o Chapter 7, "Schemas" • Labs: 9.1 • Assignments: 9.1 • Course Project: Part 7 • Quizzes: 9.1
10– Schema Data Processing	• Read from *XML How to Program:* o Chapter 8, "Document Object Model (DOM)" • Labs: 10.1 • Assignments: 10.1 • Course Project: Part 8 • Quizzes: 10.1
11– Course Review and Exam	• Review • Exam II

Instructional Methods

This curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools.

The Database Development course introduces database concepts and the role of databases in both Windows and Web applications. The programming language-neutral course focuses on relational databases, but also introduces hierarchical storage using XML. The course introduces basic data modeling and normalization concepts. You will learn to use basic SQL command statements to retrieve and modify data.

Both Microsoft SQL Server and MySQL are introduced as relational database management systems and XML is introduced as a hierarchical data storage option. It is assumed that you have little experience with databases and XML at the beginning of this course.

During the course, you will not only learn database and data management concepts, but also how to apply these concepts in real-world situations. At the end of the course, you should be able to design and implement a simple data storage solution. Concepts introduced here will be used in courses throughout the rest of the curriculum.

Much of the course is conceptual, with the early unit labs emphasizing design and reporting activities and written design assignments. You will have ample opportunity for hands-on practice after specific database platforms are introduced. You will design a database in earlier course activities, then implement and test the database in later activities.

Database hands-on activities will use SQL language statements for database and database object creation, access, and data modification. The course is purposely kept as programming language-neutral as possible so that you can concentrate on the database as a back-end resource for an application without worrying about the language used to create the application. This will help to emphasize modular programming and distributed application concepts taught throughout the curriculum.

Written assignments will focus on database design and the role that databases play in both Windows and Web applications. You will also contrast and compare database and data storage options to identify the most appropriate solutions.

Advanced data management concepts, such as data mining and data warehousing, are taught as an overview only. You should be familiar with the concepts and how they apply to application development, but will not be learning about these technologies in any great depth.

XML is included as a hierarchical data storage option, but lectures will also emphasize how XML is used internally by various applications, as a way to store configuration information, and as an Internet-compatible data transmission format. Later courses will rely on this XML foundation for advanced programming concepts.

The course project is designed as a team activity, having students work together to design and implement a database solution. Writing skills are emphasized by having students not only document, but also justify, their design decisions.

Instructional Materials and References

Student Textbook Package

Frost, Raymond, Craig Van Slyke, David Kroenke, et al. *Database Development Custom Edition. Indianapolis, IN: Pearson Custom Publishing, 2009.*

Other Required Resources

In addition to the student textbook package, the following is also required in this course:

- Internet access

Equipment and Tools

- Standard classroom PC

- Microsoft Windows XP Professional Service Pack 2

- Microsoft SQL Server 2005 Express Edition

- MySQL

- Microsoft Office

- Microsoft Visio

- Visual Studio

References

ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at http://www.library.itt-tech.edu/ to access online books, journals, and other reference resources selected to support ITT Tech curricula.

<u>Books</u>

You may click "Books" or use the "Search" function on the home page to find the following books.

- ITT Tech Virtual Library> Main Menu> Books> Books 24x7

  o Bagui, Sikha and Richard Earp. *Database Design Using Entity-Relationship Diagrams. Boca Raton, FL: Auerbach Publications, 2003.*

  o Dewson, Robin. *Beginning SQL Server 2005 for Developers: From Novice to Professional. Berkeley, CA: Apress, 2006.*

  o Gehani, Narain. *The Database Book: Principles & Practice Using MySQL. Summit, NJ: Silicon Press, 2007.*

  o Haley, M. Allen. *The Concordance Database Manual. Berkley, CA: Apress, 2006.*

  o Horn, John W. and Michael Grey. *MySQL: Essential Skills. Emeryville, CA: McGraw-Hill/Osborne, 2004.*

  o Nielson, Paul. *SQL Server 2005 Bible. Indianapolis, IN: John Wiley & Sons, 2007.*

  o Powell, Gavin. *Beginning XML Databases. Indianapolis, IN: Wiley Publishing, 2007.*

  o Powell, Gavin. *Beginning Database Design and Implementation. Indianapolis, IN: Wiley Publishing, 2006.*

  o Reingruber, Michael and William W. Gregory. *The Data Modeling Handbook: A Best-Practice Approach to Building Quality Data Models. Indianapolis, IN: John Wiley & Sons, 1994.*

  o Shapiro, Jeffrey. *Microsoft SQL Server 2005: The Complete Reference. New York: McGraw-Hill/Osborne, 2007.*

  o Sheldon, Robert and Moes, Geoff. *Beginning MySQL. Indianapolis, IN: Wiley Publishing, 2005.*

  o Siau, Ken. *Contemporary Issues in Database Design and Information Systems Development. Hershey, PA: IGI Publishing, 2007.*

  o Silverston, Len. *The Data Model Resource Book: A Library of Universal Data Models for All Enterprises, Revised Edition, Volume 1. New York: John Wiley & Sons, 2001*

- o Silverston, Len. *The Data Model Resource Book: A Library of Universal Data Models for All Enterprises, Revised Edition, Volume 2.* New York: John Wiley & Sons, 2001.

- o Taylor, Allen G. *Database Development for Dummies. Foster City, CA: John Wiley & Sons, 2001.*

- o Watt, Andrew. *Microsoft SQL Server 2005 Programming For Dummies. Hoboken, NJ: John Wiley & Sons, 2007.*

- ITT Tech Virtual Library> Main Menu> Books> NetLibrary

  - o Gavin, Powell. *Beginning Database Design. Indianapolis, IN: John Wiley & Sons, 2006.*

  - o Halpin, T.A. *Information Modeling and Relational Databases: From Conceptual Analysis to Logical Design. San Francisco: Elsevier, 2001.*

  - o Watt, Andrew, *Microsoft SQL Server 2005 for Dummies. Indianapolis, IN: John Wiley & Sons, Inc., 2006.*

Periodicals

You may click "Periodicals" or use the "Search" function on the home page to find the following periodicals.

- ITT Tech Virtual Library> Main Menu> Periodicals

  - o *Database Journal*

- ITT Tech Virtual Library> Main Menu> Periodicals> Proquest Computing

  - o *SQL Server Magazine*

  - o *Computer Weekly*

  - o *Journal of Logic and Computation*

  - o *Worldwide Databases*

  - o *Information Week*

Reference Resources

You may click "Reference Resources" or use the "Search" function on the home page to find the following reference resources:

- Webopedia

- Free Online Dictionary of Computing

- Glossary of Internet Terms

Learning Guides

You may click "Learning Guides" or use the "Search" function on the home page to find the following learning guides.

- ITT Tech Virtual Library> Main Menu> Learning Guides>

  - Computer Technical Tutorials

  - Edumax

  - Programming Tutorials

  - SQL Course

  - XML Beginner's Guide

Other References

The following resources may be found **outside** of the ITT Tech Virtual Library, whether online or in hard copy.

Web sites

- Microsoft Developer Network (MSDN)

  http://msdn2.microsoft.com/en-us/default.aspx

  This vendor page links to information about developer tools and languages and Web and application-specific development.

- MySQL Home Page
  http://www.mysql.com

This page links to news, demos, applications, and education concerning the MySQL open source database.

All links to Web references outside of the ITT Tech Virtual Library are always subject to change without prior notice.

Course Evaluation and Grading

Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Assignments	10%
Course Project	15%
Labs	25%
Midterm	15%
Quizzes	10%
Final	25%
Total	100%

Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90-100%	4.0
B+	85-89%	3.5
B	80-84%	3.0
C+	75-79%	2.5

C	70-74%	2.0
D+	65-69%	1.5
D	60-64%	1.0
F	<60%	0.0

(End of Syllabus)