

ITT Technical Institute
CS430
Database Administration and
Optimization
Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 50 (30 Theory Hours, 20 Lab Hours)

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

Prerequisite: CS330 Database Design and Implementation or equivalent

Course Description:

This course covers the skills a person needs to administer and maintain a database. Students examine issues related to data availability, concurrency, consistency, and performance.

Syllabus: Database Administration and Optimization

Instructor: _____

Office hours: _____

Class hours: _____

Major Instructional Areas

1. Database administration
2. Database security
3. Transaction processing
4. High availability
5. Backup, restore, and data recovery
6. Index design
7. Server optimization
8. Query optimization
9. Performance monitoring
10. Application development

Course Objectives

1. Administer SQL Server 2008 server and database components.
2. Configure and manage security and access.
3. Configure and maintain data availability.
4. Configure and manage high-availability features.
5. Configure and use database mail, notification, and scheduling.
6. Manage and optimize transaction and locking performance.
7. Analyze and optimize queries and index use.
8. Monitor and optimize server performance.
9. Design and implement applications using SQL Server2008.

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. Select and analyze information and communicate the results.
5. Determine which set of procedures will produce the desired results and make clear recommendations including rationale.
6. Analyze system and develop new or alternative systems.
7. Demonstrate the ability to make a rational decision based on analysis of accepted theories, evidence, and logical thinking.

Course Outline

Note: All graded activities, except the Project, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Labs: 3.1 refers to the first lab activity in Unit 3.

Unit	Activities
1—SQL Server Administration	<ul style="list-style-type: none"> • Content Covered <ul style="list-style-type: none"> <i>Microsoft SQL Server 2008 R2 Unleashed</i> <ul style="list-style-type: none"> ○ Chapter 4, “SQL Server Management Studio” ○ Chapter 5, “SQL Server Command-line Utilities” ○ Chapter 6, “SQL Server Profiler” • Labs: 1.1 • Assignments: 1.1 • Course Project: Part 1
2—SQL Server Configuration and Security	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 7, “SQL Server System and Database Administration” ○ Chapter 10, “Client Installation and Configuration” ○ Chapter 11, “Security and User Administration” • Labs: 2.1, 2.2 • Assignments: 2.1 • Course Project: Part 2
3—Managing Backup, Restore, and Periodic Activities	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 14, “Database Backup and Restore” ○ Chapter 15, “Database Mail” ○ Chapter 16, “SQL Server Scheduling and Notification” • Labs: 3.1, 3.2 • Assignments: 3.1 • Course Project: Part 3
4—SQL Server High Availability, Part 1	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 18, “SQL Server High Availability” ○ Chapter 19, “Replication” • Labs: 4.1 • Assignments: 4.1 • Course Project: Part 4 • Quizzes: 4.1
5— SQL Server High Availability, Part 2	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 20, “Database Mirroring” ○ Chapter 21, “SQL Server Clustering” • Labs: 5.1 • Assignments: 5.1 • Course Project: Part 5
6—Transactions and Database Maintenance	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 31, “Transaction Management and the Transaction Log” ○ Chapter 32, “Database Snapshots” ○ Chapter 33, “Database Maintenance” • Labs: 6.1 • Assignments: 6.1 • Course Project: Part 6 • Midterm Exam
7—Indexes and Query	<ul style="list-style-type: none"> • Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>:

Unit	Activities
Optimization	<ul style="list-style-type: none"> ○ Chapter 34, "Data Structures, Indexes and Performance," pp. 1132-1207 ○ Chapter 35, "Understanding Query Optimization" ○ Chapter 36, "Query Analysis" ● Labs: 7.1 ● Assignments: 7.1 ● Course Project: Part 7
8—Performance Monitoring and Optimization	<ul style="list-style-type: none"> ● Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 37, "Locking and Performance" ○ Chapter 38, "Database Design and Performance" ○ Chapter 39, "Monitoring SQL Server Performance" ● Labs: 8.1, 8.2 ● Assignments: 8.1 ● Course Project: Part 8
9—SQL Server and .NET	<ul style="list-style-type: none"> ● Read from <i>Microsoft SQL Server 2008 R2 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 43, "Transact-SQL Programming Guidelines, Tips, and Tricks," pp. 1687-1731 ○ Chapter 45, "SQL Server and the .NET Framework" ○ Chapter 46, "SQLCLR: Developing SQL Server Objects in .NET" ● Labs: 9.1 ● Assignments: 9.1 ● Course Project: Part 9 ● Quizzes: 9.1
10—XML and Web Service Support	<ul style="list-style-type: none"> ● Read from <i>Microsoft SQL Server 2005 Unleashed</i>: <ul style="list-style-type: none"> ○ Chapter 47, "Using XML in SQL Server 2008" ○ Chapter 48, "SQL Server Web Services" ● Labs: 10.1 ● Assignments: 10.1 ● Course Project: Part 10
11—Course Review and Final Exam	<ul style="list-style-type: none"> ● Review ● Final Exam

Instructional Methods

Database Administration and Optimization builds on what you have already learned about database design and implementation. It covers skills a person needs to administer and maintain a database and those needed for application development. The course focuses on Microsoft SQL Server 2008 and the .NET Framework, but the concepts taught here are easily applied to other development platforms.

You should already be familiar with database concepts and with the SQL language. You should also be familiar with Microsoft Visual Studio 2010 and the .NET Framework, including Visual Basic and C# programming languages.

The course emphasizes working in a team environment with a focus on application development. You will have several opportunities to practice your writing skills during labs, assignments, and the course project. Grading of written work will focus on how well you have thought out the documentation requirements. The importance of clear, easy-to-understand documentation will be emphasized.

The course includes extensive hands-on activities to let you see the concepts discussed displayed in situations that simulate real-world database requirements. All lab exercises are performed on the ITT Tech Lab Virtual Machine.

The hands-on project has two major parts: first, you will design a database solution, including maintenance procedures and disaster recovery plans, and second, you will document your project solution.

Instructional Materials and References

Student Textbook Package

Rankins, Ray, Paul Bertucci, Chris Gallelli, and Alex T. Silverstein. *Microsoft SQL Server 2008 R2 Unleashed*. Indianapolis: Sams Publishing, 2011.

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 or later
- ITT-Lab virtual machine
- Microsoft Visio
- Microsoft Office

References

ITT Tech Virtual Library

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

Books

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

- Bagui, Sikha and Earp, Richard. *Essential SQL on SQL Server 2008*. Sudbury, MA: Jones and Bartlett, 2011.
- Ben-Gan, Itzik, Lubor Kollar, and Dejan Sarka. *Inside Microsoft SQL Server 2005: T-SQL Querying*. Redmond, WA: Microsoft Press, 2006.
- Brust, Andrew J., and Stephen Forte. *Programming Microsoft SQL Server 2005*. Redmond, WA: Microsoft Press, 2006.
- Delaney, Kalen. *Inside Microsoft SQL Server 2005: Query Tuning and Optimization*. Redmond, WA: Microsoft Press, 2008.
- Garbus, Jeffrey. *Microsoft Transact-SQL: The Definitive Guide*. Sudbury, MA: Jones and Bartlett, 2011.
- Gibson, Darril. *MCITP SQL Server 2005 Database Administration All-in-One Exam Guide* (Exams 70-431, 70-443, and 70-444). New York: McGraw-Hill, 2008.
- Goswami, Hemantgiri S. *Microsoft SQL Server 2008 High Availability*. Birmingham, UK: Packt Publishing, 2011.
- Graham, Tyler and Selhorn, Suzanne. *Microsoft SQL Server 2008 R2 Master Data Services: Implementation & Administration*. New York: McGraw-Hill/Osborne, 2011.
- Knight, Brian, et al. *Professional SQL Server 2005 Administration*. Indianapolis: Wiley Publishing, Inc., 2007.

- Nielsen, Paul, Parui, Uttam, and White, Mike. *Microsoft SQL Server 2008 Bible*. Indianapolis, IN: John Wiley & Sons, 2009
- Nielsen, Paul. *SQL Server 2005 Bible*. Wiley Publishing, Inc. 2007
- Otey, Michael, and Denielle Otey. *Microsoft SQL Server 2005 Developer's Guide*. New York: McGraw-Hill, 2006.
- Otey, Michael. *Microsoft Transact-SQL: The Definitive Guide*. Sudbury, MA: Jones and Bartlett, 2011.
- Shapiro, Jeffrey R. *Microsoft SQL Server 2005: The Complete Reference*. New York: McGraw-Hill, 2007.
- Solid Quality Learning. *Microsoft SQL Server 2005: Applied Techniques Step by Step*. Redmond, WA: Microsoft Press, 2006.
- Vieira, Robert. *Professional SQL Server 2005 Programming*. Indianapolis: Wiley Publishing, Inc., 2007.
- Weller, Bart. *Beginning SQL Server Modeling: Model-Driven Application Development in SQL Server 2008*. Apress, 2010.
- Whalen, Edward, et al. *Microsoft SQL Server 2005 Administrator's Companion*. Redmond, WA: Microsoft Press, 2007.
- Wort, Steven, et al. *Professional SQL Server 2005 Performance Tuning*. Indianapolis: Wiley Publishing, Inc., 2008.

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> ProQuest Computing>

- Computer Weekly
- Enterprise Networks & Servers
- Intelligent Enterprise
- Network Computing

School of Information Technology

Recommended Links

- Application Development Trends
- MSDN Library: Windows Media Developer Center
- MSDN Magazine

Other References

The following resources may be found **outside** of the ITT Tech Virtual Library.

Websites

- Microsoft Developer Network (MSDN)
<http://msdn.microsoft.com> (accessed Jan. 5, 2010)
This Microsoft portal page links to resources and tools for developers of Windows, Web, Office, Server, and various languages.
- Microsoft SQL Server <http://www.microsoft.com/Sqlserver/en/us/default.aspx>
(accessed June 29, 2012)
This page links to downloads, demos, and resources supporting SQL Server .
- Microsoft SQL Server 2008 Resources
<http://technet.microsoft.com/en-us/sqlserver/bb671410>
(accessed June 29, 2012)
This is the home page for Microsoft's SQL Server TechCenter supporting SQL Server 2008.
- SQL Server 2008 Documentation

<http://technet.microsoft.com/en-us/library/dd631854%28v=sql.10%29> (accessed June 29, 2012)

This is the home page for Microsoft's online SQL Server 2008 documentation.

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
Course Project	15%
Labs	25%
Midterm Exam	15%
Quizzes	10%
Assignments	10%
Final Exam	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