

UNIVERSITY OF NEBRASKA AT OMAHA
COURSE SYLLABUS/DESCRIPTION

Department and Course Number	ISQA 4300
Course Title	Database Administration
Course Coordinator	Peter Wolcott
Total Credits	3
Date of Last Revision	3/14/11

1.0 Course Description:

- 1.1 Overview of content and purpose of the course (Catalog description).
This course is designed to give students an applied, practical introduction to database administration. Students will gain an understanding of the functioning of a database management system and its relationship to the computing environment in which it runs. They will learn the concepts, principles, and techniques necessary to carry out such functions as database object creation, storage management, capacity planning, performance tuning, backup and recovery, and security management. Each semester the course will focus on one commercial DBMS, such as Oracle.
- 1.2 For whom course is intended.
The course is intended for upper division undergraduate MIS or CS majors who wish to pursue the topic of database and data administration beyond the level of an introductory database course.
- 1.3 Prerequisites of the course (Courses)
 - 1.3.1 ISQA 3300
 - 1.3.2 ISQA 3310 or CSCI 4850
- 1.4 Prerequisites of the course (Topics)
 - 1.4.1 Relational Model
 - 1.4.2 Structured Query Language (SQL)
 - 1.4.3 Secondary storage & I/O
 - 1.4.4 Indexing
- 1.5 Unusual circumstances of the course.
None

2.0 Objectives:

- 2.1 Understand the roles, issues, and tasks associated with the database administration function.

- 2.2 Understand computer system and DBMS architecture and how the DBMS stores and maintains data, executes queries, and performs other data management tasks.
- 2.3 Create a variety of database objects, such as tablespaces, indexes, and user objects.
- 2.4 Plan and implement the physical organization of a database.
- 2.5 Understand and use the system catalog in a variety of database administration tasks.
- 2.6 Gather, interpret, and act on database statistics to monitor database activity and tune for performance.
- 2.7 Plan and execute backup and recovery activities.
- 2.8 Secure the database and manage users.
- 2.9 Develop good database management discipline

3.0 Content and Organization:

	Contact hours
3.1 Overview of Database Administration	1.5
3.2 System architecture	4.5
3.3 DBMS architecture	3.0
3.4 Data Dictionary	1.0
3.5 Control Files	1.0
3.6 Redo log files	1.0
3.7 Basic Storage Concepts	4.5
3.8 Database object creation	4.5
3.9 Concurrency Control and Lock management	6.0
3.10 Query processing	1.5
3.11 User administration and security	3.0
3.12 Managing Data with exports, imports, and loading	1.5
3.13 Network services	1.5
3.14 Performance monitoring and tuning	3.0
3.15 Backup & recovery	3.0

4.0 Teaching Methodology:

4.1 Methods to be used.

The primary teaching methods will be lecture, in-class demonstrations, and in-class exercises

4.2 Student role in the course.

The student will attend lectures and demonstration, participate in discussion on assigned readings, complete assigned projects, and complete required examinations

4.3 Contact hours.

Three (3) hours per week.

5.0 Evaluation:

- 5.1 Type of student projects that will be the basis for evaluating student performance, specifying distinction between undergraduate and graduate, if applicable. For Laboratory projects, specify the number of weeks spent on each project).

Students will complete a sequence of assignments desired to provide hands-on exposure to the topics discussed in class, and take two examinations.

- 5.2 Basis for determining the final grade (Course requirements and grading standards) specifying distinction between undergraduate and graduate, if applicable.

Component	Grading
Exams	35%
Assignments	60%
Participation	5%

- 5.3 Grading scale and criteria.

<i>Points</i>	<i>Grade</i>
97-100%	A+
93-96%	A
90-92%	A-
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
67-69%	D+
63-66%	D
60-62%	D-

6.0 Resource Material

- 6.1 Textbooks and/or other required readings used in course.
- 6.1.1 Watson, J. 2008. *OCA Oracle Database 11g: Administration I Exam Guide*. McGraw-Hill.
- 6.2 Other suggested reading materials, if any.
- 6.2.1 The DAMA Guide to the Data Management Body of Knowledge, First Edition. (Technics Publications LLC, 2009).
- 6.2.2 Greenwald, R., Stackowiak, R., and Stern, J. 2008. *Oracle Essentials: Oracle Database 11g*. Sebastopol, CA: O'Reilly Media, Inc.

- 6.2.3 Powell, G., and McCullough-Dieter, C. 2007. *Oracle 10g Database Administrator: Implementation & Administration*. Boston, MA: Thomson Course Technology.
- 6.2.4 Loney, K. and Bryla, B. *Oracle Database 10g DBA Handbook*, Oracle Press, 2005.
- 6.2.5 Whalen, E. *Oracle Database 10g Linux Administration*, Oracle Press, 2005.
- 6.3 Other sources of information.
 - 6.3.1 Oracle Technet: <http://technet.oracle.com>
 - 6.3.2 <http://pipetalk.revealnet.com/~dba>
 - 6.3.3 <http://www.lazydba.com/>
- 6.4 Current bibliography of resource for student's information.
 - 6.4.1 Bryla, Bob, and Kevin Loney. *Oracle Database 11g Dba Handbook: The McGraw-Hill Companies, Inc.*, 2008.
 - 6.4.2 Fernandez, Iggy. *Beginning Oracle Database 11g Administration: From Novice to Professional*: Apress, 2008.
 - 6.4.3 Afyouni, H.A. *Database Security and Auditing: Protecting Data Integrity and Accessibility*, Thomson Course Technology, Boston, MA, 2006.
 - 6.4.4 Morris-Murphy, L.L. *Oracle9i Database Administrator II: Backup/Recovery & Network Administration*, Thomson Course Technology, Boston, 2004.
 - 6.4.5 *Oracle Security Handbook*, by Marlene Theriault & Aaron Newman, Osborne/McGraw-Hill, 2001.
 - 6.4.6 Sharma, V. Bitmap Index vs. B-tree Index: Which and When?, Oracle Corp., 2005. http://www.oracle.com/technology/pub/articles/sharma_indexes.html, Current September 27, 2005.
 - 6.4.7 Morrison, J., Morrison, M. and Conrad, R. *Guide to Oracle10g*, Thomson Course Technology, Boston, 2006.

7.0 (IS Program) Estimate Computing Accreditation Commission Category Content (class time in hours):

<i>CAC Category</i>	<i>Core</i>	<i>Advanced</i>
Hardware and software		27
Networking and telecommunications		
Modern programming language		
Analysis and Design		
Data management		15
Role of IS in Organizations		

8.0 Oral and Written Communications:

Every student is required to submit at least __0__ written reports (not including exams, tests, quizzes, or commented programs) to typically _____ pages and to make __0__ oral presentations of typically _____ minutes duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

9.0 Social and Ethical Issues:

No coverage.

10.0 Theoretical content:

This course deals mostly with physical, not logical design, and includes a number of topics included in IS'97 Information Systems Theory and Practice:

- 10.1 Implementation and evaluation of system performance 3
- 10.2 Theory of concurrency control 4.5

11.0 Problem analysis:

Students learn to analyze the state of the database in three areas in particular: storage management, user administration, and performance management. In storage management, students learn to determine the placement of database objects within data files in order to be able to detect fragmentation of files and of database objects. In user administration, students learn to identify the privileges given to users to detect potential security issues. In performance management, students learn about key performance indicators and a process for isolating and resolving performance problems.

12.0 Solution design:

Students learn to make and implement a variety of physical design decisions, including: creation of tablespaces and files of appropriate size with appropriate storage allocation patterns, determination of block structure for tables and indexes, and creation of indexes. Students also learn to determine an appropriate basket of privileges for various types of users.

CHANGE HISTORY

<i>Date</i>	<i>Change</i>	<i>By whom</i>	<i>Comments</i>
5/21/02	Initial ABET version	Wolcott	
6/25/03	ABET cleanup	Wolcott	
10/3/07	Updated resource material Minor updates to content & organization	Wolcott	
9/30/08	Update of the reading list & reference list	Wolcott	
3/14/11	Update of the reading list & reference list	Wolcott	