Course Details

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<th>Credits</th>
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<td>ECTS Credits</td>
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<tr>
<td>Prerequisite</td>
<td>CTIS259</td>
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<tr>
<td>Semester</td>
<td>2016-2017 Spring</td>
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Instructor

<table>
<thead>
<tr>
<th>E-mail</th>
<th><a href="mailto:fusun@ctp.bilkent.edu.tr">fusun@ctp.bilkent.edu.tr</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Room, Phone</td>
<td>E116, 290 5322</td>
</tr>
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Assistant

<table>
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<tr>
<th>E-mail</th>
<th><a href="mailto:efecan.yilmaz@bilkent.edu.tr">efecan.yilmaz@bilkent.edu.tr</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Room, Phone</td>
<td>E114, 290 5337</td>
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Lecture hours | 4 |
Lab hours | 1 |
URL (web pages) | Moodle pages |

MINIMUM REQUIREMENTS TO QUALIFY FOR THE FINAL EXAM:
20 pts. Over 65 (The assessment percentage completed before the final exam). 50% for the attendance.

Course Description
Oracle Database Architecture, Database Installation, Creating Database Using DBCA, Database Instances, ASM Instances, Network Environment, Storage Structures, User Security, Concurrency Control Mechanisms, Database Auditing and Maintenance, Performance Management, Backup and Recovery Concepts, Moving Data, Database Restart. Whole content will be explained in Oracle environment and students will have rights to take Oracle Database 11g: Administration I 1Z0-052 exam as part of the Oracle Academy membership, and be able to take Oracle Database 11g Administrator Certified Associate (OCA). (Four hours lecture, two hours lab.)

Aim
The aim of this course is to introduce students to the basic database management administration concepts and practice on the Oracle environment. This course give chance to students to take "Oracle Database 11g Administrator Certified Associate (OCA)" certificate which is very valuable for their professional life.

Course Objectives
Successful students will be able to:
- Installing Oracle Software
- Creating an Oracle Database Using DBCA
- Managing Database instances and ASM instances
- Managing and controlling database network environment
- Define and devise transaction management, concurrency control, crash recovery components
- Managing storage structures
- Controlling user security
- Designing Database backup and recovery procedures
- Take Decisions related with Database Maintenance

Course Outline:
- Oracle Database Architecture
- Database installation and creation. (use DBCA)
- Managing Database instances and ASM instances
- Oracle Network environment
- Database storage structures
- User security
- Concurrency control
- Database auditing
- Database maintenance
- Crash Recovery
Learning Outcomes

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ASSESSMENTS</th>
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<tbody>
<tr>
<td>Design, model and install any database management systems by using Oracle database as sample.</td>
<td>Quiz, midterm, final</td>
</tr>
<tr>
<td>Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance</td>
<td>Quiz, midterm, final</td>
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<tr>
<td>Define and devise transaction management, concurrency control, crash recovery components</td>
<td>Quiz, midterm, final</td>
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<tr>
<td>Examine and perform database administration roles and operations by using Oracle database system as a sample.</td>
<td>Quiz, midterm, final</td>
</tr>
<tr>
<td>Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.</td>
<td>Presentation and Report, performance</td>
</tr>
</tbody>
</table>

Text Book:
- Student Guides for Oracle Database Administration. Year/Edition: 2010 Aug
  Title: Oracle Database 11g: Administration Workshop 1 (Volume 1 and 2)

Reference Books:
- Physical Database Design, Lightstone/Teorey/Nadeau, Morgan Kaufman, 2007, Publisher: ELSEVIER
- Concurrency Control and Recovery in Database Systems, Bernstein/Hadzilacos/Goodman, 1987, Addison-Wesley
- Data Base Systems, Design, Implementation and Management, Rob, Coronel, Thomson Course Technology
- Databases and Transaction Processing, Lewis, Bernstein, Kifer, Addison Wesley, 2001
- Concepts of Data Base Management, Pratt/Adamski, Thomson Course Technology
- Database Management Systems, Ramakrishnan/Gehrke, McGraw-Hill

Types of Instruction
- Lecture
- Exercise Course
- Practical
- Laboratory Work
- Independent Studies
- Guided Personal Study

Teaching Methods
- Lecture
- Presentations
- Practical session
- Case studies
- Exercises
- Independent study
- Assignment

Instructional Techniques and Tools
- Lecturing
- Problem solving
- Project based
- Interactive
- Hands-on
Assessments and Grading:

<table>
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<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tr>
<td>Midterm (2)</td>
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<tr>
<td>Quiz(s) (1)</td>
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<tr>
<td>Performance</td>
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<td>Presentation</td>
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<td>Final</td>
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GRADING:

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<td>B</td>
<td>74-69</td>
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<td>C+</td>
<td>68-64</td>
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<td>C</td>
<td>63-59</td>
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<td>D+</td>
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<td>D</td>
<td>53-49</td>
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<td>0-49</td>
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</table>

Lab Aim, Grading, Details

The aim of the lab is to practice on all the given topics in Oracle environment. Student knowledge, practice and applications will be completed in the lab hours.

Make-up Policy

There is a single make-up for all midterms and there will be no makeup but re-take exam for final. Makeup exam will be given one day before the final exams.

Attendance:

Attendance to the course hours and laboratory hours will not be graded. But they will affect the performance grade.

Academic Integrity

Each student has a responsibility to understand, accept and comply with the university’s standards of academic conduct as set forth by the Code of Academic Conduct, as well as policies established by the schools and colleges. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offense. “Student Code Of Discipline” is presented in the web page:


Weekly outline:  (based on a semester with 14 full weeks)

<table>
<thead>
<tr>
<th>Wk.</th>
<th>DATE</th>
<th>Lecture</th>
<th>LABS</th>
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</table>
| 01  | 6-10 Feb. | **Introduction**  
Exploring the Oracle Database Architecture (CH1)  
- Connecting to a server  
- Oracle Database Server Architecture  
- Instance: Database Configurations |      |
| 02  | 13-17 Feb. | **Transactions**  
- Properties (ACID Rules)  
- Life Cycle  
Concurrency control  
- Why do we need concurrency control?  
- Types of concurrency control mechanisms  
- Basic samples  
Crash Recovery Components.  
- Undo and Redo operations  
- Examples for different component behaviors  
Deadlocks | Lab 1:  
**Installing your Oracle Software (CH2)**  
- Database administrator (DBA) role and typical tasks and tools  
- Oracle software installation  
- Oracle Grid Infrastructure installation for a standalone server |
| 03  | 20-24 Feb. | **Transactions**  
- Properties (ACID Rules)  
- Life Cycle  
Concurrency control  
- Why do we need concurrency control?  
- Types of concurrency control mechanisms  
- Basic samples  
Crash Recovery Components.  
- Undo and Redo operations  
- Examples for different component behaviors  
Deadlocks | Lab 2:  
**Creating an Oracle Database Using DBCA (CH3)**  
- Oracle database software installation  
Creating an Oracle Database using DBCA (Data Base Configuration Assistant)  
- Database creation scripts with the DBCA  
- Database design templates management with the DBCA  
- Additional tasks with the DBCA |
<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Labs</th>
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</table>
| 04   | 27 Feb.-3 March | CH1- Part2  
- Process Structures  
- Background processes - Database Writer Process (DBWn)  
- BP- Log Writer Process (LWR)  
| 05   | 6-10 March  | BP-System Monitor Process (SMON)  
BP-Process Monitor Process (PMON)  
BP-Recoverer Process  
BP-Archiever Process (ARCn)  
Process Startup Sequence  
Database Storage Architecture  
Logical and physical storage structures  
Segments, Extents and Blocks  
Table spaces and Data files  
SYSTEM and SYSAUX Table spaces  
ASM storage components  
Interacting with an Oracle Database  
Managing the Database instance (CH4)  
- Database initialization parameters modification  
- Stages of database startup  
- Database shutdown modes and options  
- Alert log  
- Using Trace Files  
- Dynamic performance views  
- Data Dictionary views  
- Data dictionary from SQL Expert | Lab 4: Understanding the COMMIT/ROLLBACK/LOCKING |
| 06   | 13-17 March | Managing the ASM instance (CH5)  
- Benefits of using ASM  
- ASM instance processes and parameters  
- Interaction between database instances and ASM  
- ASM instance dynamic performance views  
- ASM system privileges  
- ASM disk groups  
- ASM disks  
- Allocation units  
- ASM files  
- Extent Maps  
- Striping granularity  
- Fine-Grained Striping  
- ASM Failure groups  
- Stripe and mirror example  
- Failure example  
- Managing disk groups  
- Adding disk to disk groups  
- Alter commands  
- ASM disk group compatibility  
- Disk Group Attributes  
- ASM Fast Mirror Resync Overview | Lab 5: (CH4)  
Starting and stopping Database control (Start and stop the Oracle database and components)  
Oracle Enterprise Manager  
Database Home page  
Using SQL*Plus  
View Parameters  
Database Startup and Shutdown credentials  
Viewing Alert Log |
| 07   | 20-24 March | Configuring the Oracle Network environment (CH6)  
- Creating additional listeners  
- Creating Oracle Net Service aliases  
- Configuring connect-time failover  
- Controlling the Oracle Net Listener  
- Using tnsping to test Oracle Net connectivity  
- Shared servers versus dedicated servers  
Managing Database Storage Structures (CH7)  
- Storage of table row data in blocks  
- Oracle-Managed Files (OMF)  
- Enlarging the database | LAB 6: (CH5)  
Manage ASM users (Enterprise Manager)  
Start/Stop ASM instance (SQL *Plus)  
Start/Stop ASM instance (srvctl)  
Start/Stop ASM instance (asmcmd)  
Create and drop disk groups  
Adding disk to disk groups  
ASM Management Using Enterprise Manager  
Disk Group Attributes  
Retrieving ASM Meta data |
| 08   | 27-31 March | MIDTERM 1  
Administering User security (CH8)  
- Create and manage database user accounts:  
  i. Authenticate users | Lab 7: (CH6)  
Listener control utility  
Using srvctl to start stop the listener  
Listener home page |
### CTIS483 - Database Administration Syllabus

#### ii. Assign default storage areas (table spaces)
- Administer authentication
- Grant and revoke privileges (system & object privileges)
- Create and manage roles
- Predefined roles
- Create and manage profiles:
  i. Implement standard password security features
  ii. Control resource usage by users
- Supplied password verification function
- Assigning quotas to users
- Principle of least privilege
- Protect privileged accounts

### Net services administration page
- Creating listener
- Database service registration
- Configuring service aliases
- Advanced connection options
  (CH7)
- Managing Database Storage Structures
- Exploring storage structure
- Creating new table space
- Storage for Table spaces
- Altering / actions/drop / view table space & contents

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Lab/Exercise</th>
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<tbody>
<tr>
<td>3-7 April</td>
<td>Managing Data Concurrency (CH9)</td>
<td>Lab 8: (CH8) Administering Users</td>
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<tr>
<td>10-14 April</td>
<td>Implementing Oracle Database Auditing (CH11)</td>
<td>(CH10) Managing Undo segments</td>
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<td>Managing Data Concurrency (CH9)</td>
<td>Lab 9: (CH9) Detecting Lock conflicts</td>
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<td>Implementing Oracle Database Auditing (CH11)</td>
<td>Resolving Lock conflicts</td>
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<td>Database Maintenance (CH12)</td>
<td>Changing Undo Table space to fixed size</td>
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<td>Database Maintenance (CH12)</td>
<td>General Undo Information</td>
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<tr>
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<td>- Managing optimizer statistics</td>
<td>Using undo advisor</td>
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<td>- Preferences for Gathering Statistics</td>
<td>Viewing Systems Activity</td>
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<td>- Managing the Automatic Workload Repository (AWR)</td>
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<td>- Automatic Database Diagnostic Monitor (ADDM)</td>
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<td>- Advisory framework</td>
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<td>- Automated Maintenance Tasks</td>
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<td>- Server-generated alerts</td>
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<td>- Setting alert thresholds</td>
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<td>- Reacting to alerts</td>
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<td>- Alert types and clearing Alerts</td>
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<td>17-21 April</td>
<td>MIDTERM 2 Performance Management (CH13)</td>
<td>Lab 10: (CH 11) Configuring Audit Trail</td>
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<tr>
<td></td>
<td>- Use Enterprise Manager to monitor performance</td>
<td>Specifying audit options</td>
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<td>- Use Automatic Memory Management (AMM)</td>
<td>Default Auditing</td>
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<td>- Use the Memory Advisor to size memory buffers</td>
<td>Enterprise Manager Audit Page</td>
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<td>- View performance-related dynamic views</td>
<td>Using and maintaining audit page/information</td>
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<td>- Troubleshoot invalid and unusable objects</td>
<td>Value-Based Auditing</td>
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<tr>
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<td>- Managing AWR</td>
<td>(CH 12) Proactive Maintenance</td>
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<td>- Viewing Alert History</td>
<td>Using Manager Optimizer Statistics Page</td>
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<td>- Using Enterprise Manager and AWR</td>
<td>Enterprise Manager and AWR</td>
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<td>- Managing AWR</td>
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</table>
|   |   |   | ADDM Findings/Recommendations
|   |   |   | EM and Advisors
|   |   |   | Automated Maintenance Tasks
|   |   |   | Setting thresholds
|   |   |   | Creating and testing Alert
|   |   |   | Alert notifications

|   | 24-28 April |   | Backup and Recovery Concepts (CH14)  
|   |   |   | • Types of failure that can occur in an Oracle database (statement/user process/network/User/Instance failures)  
|   |   |   | • Flashback Technology  
|   |   |   | • Ways to tune instance recovery (Redo Log files/Log Writer)  
|   |   |   | • Using MTTR Advisor  
|   |   |   | • Media failure  
|   |   |   | • Configuring recoverability  
|   |   |   | • Configuring the fast recovery area  
|   |   |   | • Checkpoints, redo log files, and archive log files  
|   |   |   | • Achiever process  
|   |   |   | • Configuring ARCHIVELOG mode  
|   |   | Performing Database Backups (CH15)  
|   |   |   | • Consistent database backups  
|   |   |   | • Oracle Secure Backup  
|   |   |   | • User Managed Backup  
|   |   |   | • Recovery Manager (RMAN)  
|   |   |   | • Backing Up the Control File to a Trace File  
|   |   |   | Lab 11:  
|   |   |   | (CH13) Performance Management  
|   |   |   | (CH14) Backup & Recovery

| 13 | 1-5 May |   | Performing Database Recovery (CH16)  
|   |   |   | • Opening a Database  
|   |   |   | • Keeping a Database Open  
|   |   |   | • Data Recovery Advisor  
|   |   |   | • Loss of Control file/Redo Log file/data file /noncritical data file/system _critical data file  
|   |   |   | • Data failure examples  
|   |   |   | • Data recovery advisor  
|   |   |   | • Recovery:  
|   |   |   | i. Control file  
|   |   |   | ii. Redo log file  
|   |   |   | iii. Data file  
|   |   |   | Lab 12:  
|   |   |   | (CH15) Performing Backups  
|   |   |   | (CH16) Performing DB Recovery

| 14 | 8-12 May |   | Moving Data (CH17)  
|   |   |   | • Ways to move data  
|   |   |   | • Directory objects  
|   |   |   | • Using SQL*Loader to load data from a non-Oracle database (or user files)  
|   |   |   | • Using external tables to move data via platform-independent files  
|   |   |   | • General architecture of Oracle Data Pump  
|   |   |   | • Using Data Pump Export and Import to move data between Oracle databases  
|   |   |   |   | i.  
|   |   |   | Lab 13:  
|   |   |   | (CH17) Moving Data

| 15 |   |   | FINAL

**Remaining Topics for OCA Exam:**

**Working with support**  
Enterprise Manager Support Workbench  
- My Oracle Support  
- Log service requests (SR)  
- Manage patches  
  - Apply a patch  
  - Stage a patch

**Oracle Restart**