

# Cleveland State University

## CIS 612 Advanced Topics in Database Systems (3-0-3). – Fall 2011

Class no. 6496 50. Tue, Thu: 6:00 PM – 7:15 PM

**Prerequisites:** CIS 505 and CIS 530.

**Instructor:** Dr. Victor Matos

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**Office Time:** Tue, Thu 3:30-6:00 PM, Wed. 10:30-11:30 AM (or by appointment)

**Class Location:** BU 305 [6:00 – 7:15 PM]

**Catalog Description:** Detailed study of commonly used enterprise database systems. Languages and tools for server-side, and client-side database development. Query processing and optimization. Transaction handling, recovery, and concurrency control. Enforcing security and integrity constraints. Hands-on experience with relational/non-relational DBMS systems. Current topics including: object-oriented systems, cloud computing, object oriented query facilities.

**Key Concepts:** Distributed databases, client-server model, server-side application development, Oracle PL/SQL, Microsoft T-SQL, client-side programming, Java Database Connectivity, .NET technology, object databases, cloud computing.

**Expected Outcomes:** At the end of the course you will possess a deep understanding of the architecture of enterprise Relational, Object-Relational, and Object-Oriented DBMS's. You will be able to implement complete business solutions on an enterprise system such as Oracle and MS-SQL. Those solutions will include a number of server objects such as: stored procedures, functions, triggers, collections, packages, schemes. You will be able to create the most appropriate programming mechanism for enforcing operational business-rules on a given DBMS application. You will understand the various approaches to communicate with and operate on a database server when using development platforms based on Java and Microsoft .NET. You will be functionally familiarized with non-relational databases, their query facilities, and architecture.

**List of Required Materials:** Most recent Oracle DBMS Software (available for free at [www.oracle.com](http://www.oracle.com)). Microsoft SEQUEL Server ([www.microsoft.com](http://www.microsoft.com)), Microsoft Visual Studio 2010 (available from the Microsoft Academic Alliance program: [http://msdn02.e-academy.com/elms/Storefront/Home.aspx?campus=cleveland\\_cis](http://msdn02.e-academy.com/elms/Storefront/Home.aspx?campus=cleveland_cis)). Java IDE & JDBC drivers.

### Text:

1. "An Introduction to Oracle DBMS Architecture and Server-Side Programming". Victor Matos.  
Professor's notes available at <http://grail.cba.csuohio.edu/~matos/notes/cis-612/Syllabus612.html>
2. Elmasri / Navathe. "Fundamentals of Database Systems". Ed. Addison/Wesley Pub Co. 5th Edition, (2007). ISBN-10: 0321369572

### Reference books:

1. Oracle Database 11g PL/SQL Programming (Osborne ORACLE Press Series) by D.CS. Michael McLaughlin
2. Oracle 10g Developer - PL/SQL Programming. By J. Castell. Thompson Course Technology. ISBN 978-1-4239-0136-5. ( 2008)
3. Oracle Database 11g The Complete Reference. Kevin Loney (Osborne ORACLE Press Series).

### Link to Additional On-Line Resources

Lecture notes, code samples, data, tutorials, homework and projects from previous sessions are available at:  
<http://grail.csuohio.edu/~matos/notes/cis-612/Syllabus612.pdf>

**Official Calendar** Please consult the page <http://www.csuohio.edu/enrollmentservices/registrar/calendar/index.html>

**Final Exam:** Thu, Dec 15. 6:00 – 8:00 PM

**Last Day to Withdraw:** [Click here to see official CSU Calendar](#)

**Grading:** The course grade is based on a student's overall performance through the entire Semester. The final grade is distributed among the following components:

- |                                 |                               |
|---------------------------------|-------------------------------|
| 1. Exams (Mid & Final)          | 60%                           |
| 2. Computer Projects            | 30% (about 6 lab assignments) |
| 3. Research Topic Presentation: | 10%                           |

A	94% +	<b>A:</b> Outstanding (student's performance is genuinely excellent)
A-	90% - 93%	
B	82% - 87%	<b>B:</b> Very Good (student's performance is clearly commendable but not necessarily outstanding)
B-	80% - 82%	
C	75% - 80%	<b>C:</b> Good (student's performance meets every course requirement and is acceptable; not distinguished)
D	65% - 75%	<b>D:</b> Below Average (student's performance fails to meet course objectives and standards)
F	<65%	<b>F:</b> Failure (student's performance is unacceptable)

**Examination Policy:** Students are allowed to bring to the tests a summary page (standard letter size) with their own notes. During the exams: (1) the use of books, cell phones, calculators, or any electronic devices is prohibited, and (2) students must not share any materials.

**Make-Up Exam Policy:** No makeup exams will be given unless notified and agreed to in advance. Requests will be considered only in case of exceptional demonstrated need.

**Homework Policy:** The students are expected to attend all classes. The students are responsible for collecting the notes, handouts and any other course material distributed during the class period. All assignments must be individually and independently completed and must represent the effort of the student turning in the assignment. Should two or more students turn in *substantially the same solution* or output, in the judgment of the instructor, the solution will be considered group effort. All involved in group effort homework will receive a zero grade for that assignment. A student turning in a group effort assignment more than once will automatically receive an "F" grade for the course.

**Late Assignment:** All lab assignments are due at the beginning of class on the date specified. Laboratory Assignments handed in after the class has begun will be accepted with a 25% grade penalty for up to a week and then not accepted at all. All laboratory assignments must be completed. *Failure to do so will lower your course grade one additional letter grade.*

**Student Conduct:** Students are expected to do their own work. Academic misconduct, student misconduct, cheating and plagiarism will not be tolerated. Violations will be subject to disciplinary action as specified in the [CSU Student Conduct Code](#). A copy can be obtained on the web page at: [http://www.csuohio.edu/student-life/student\\_handbook/index.html](http://www.csuohio.edu/student-life/student_handbook/index.html) or by contacting Valerie Hinton Hannah, Judicial Affairs Officer in the Department of Student Life.

**Course Schedule:** The schedule of topics and their order of coverage is given below. Every effort will be made to follow the schedule, but topics covered may vary depending upon the progress made.

Week of	Topic	Reading
1	<b>Review: Database Foundations (Design and Management)</b> (EN. 8) SQL-99: Schema	Elmasri&Navathe-chp-8, 10, 11

	Definition, Constraints, Queries, and Views. (EN 10, 11). Review of Mechanical Process of Relational Database Modeling using Normalization. 3NF and BCNF databases. Synthesis and Decomposition techniques. Multi-valued Dependencies and Fourth Normal Form, other type of dependencies.	
	<b>Oracle Architecture.</b> Server configuration, options, database dictionary, DBMS physical/logical organization, memory and transactions, user and system processes.	Matos-pp-1-126 (Oracle Notes) K. Loney.
3-7	<b>PL/SQL Programming.</b> In addition to the material provided in the lecture-notes the student should follow the reading of the text from J. Casteel as follows:  1. Introduction to PL/SQL 2. Basic PL/SQL Block Structures 3. Handling Data in PL/SQL Blocks 4. Cursors and Exception Handling 5. Procedures 6. Functions 7. PL/SQL Packages	Matos-127-366 (Oracle Notes) J. Casteel
8-9	<b>PL/SQL Programming (cont)</b> 9. Database Triggers 10. Oracle-Supplied Packages and SQL*Loader 11. Introduction to Dynamic SQL and Object Technology.	Matos-367-422 (Oracle Notes)
10	<b>SQL Server Architecture.</b> T-SQL programming. Stored procedures and functions. Triggers. Using the Common Language Runtime component to execute SQL Server .NET stored procedures. Developing Windows applications using the SQL-Server. Developing Windows applications for the SQL-Server.	Matos (MS-SQL Notes)
11	<b>Client Side Development.</b> Oracle Database Applications Using Java & <b>JDBC</b>	Matos 1-81 (JDBC Notes)
12	<b>Using Microsoft client tools.</b> .NET Technology for Distributed Data Sharing Applications. Web-Database Development Using Active Server Page Technology and Web Services.	Matos (.NET Notes)
13-15	<b>Current Topics</b> – Student Presentations (sample topics): <ul style="list-style-type: none"> <li>- LINQ Language Integrated Query</li> <li>- Seam / Hibernate Framework</li> <li>- DB4O Database for Objects</li> <li>- InterSystems Cache Object Database</li> <li>- Objectivity</li> <li>- Google File System</li> <li>- Amazon Cloud Services</li> <li>- Databases for Mobile Devices (SQLLite)</li> <li>- Other client-Server development tools: PHP, Ajax</li> </ul>	

**NOTE:** The instructor reserves the right to retain, for pedagogical reasons, either the original or a copy of your work submitted either individually or as a group project for this class. Students' names will be deleted from any retained items.

**List of Assignments:**

- 1: Setting up the COMPANY database (due Monday FEB-11)
- 2: A Simplified PL/SQL Payroll Application (due on 7-Oct-2009)
- 3: OODBMS-Part1. An Object-Oriented Database Rendition of the Company Database (Due on 21-Oct-2009)
- 4: OODBMS-Part2. Oracle Object-Relational Databases. The EMPLOYEE Class (Due on 28-Oct-2009)
- 5: Introduction to Triggers - Enforcing Enterprise Behavior.
- 6: Mutating Tables – Complex Business Rules.
- 7: Client-side Development: Implementing JDBC applications.
- 8: Client-side Development: Implementing a Web-base Application Using ASP & ADO.NET.
- 9: SQL-Server. Using T-SQL to Support MSSQL Server Solutions.
10. Individual project.