

Fall 2024

## CS 434-001: Advanced Database Systems

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# Advanced Database Systems Design

Fall 2024

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| <b>Course No</b>                  | CS 434   |
| <b>Section</b>                    | 001  |
| <b>Title</b>                      | Advanced Database Systems Design   |
| <b>Date and Time</b>              | Friday: 1:00 – 3:50 PM, FMH 203  |
| <b>Prerequisites</b>              | CS 331   |
| <b>Instructor</b>                 | <b>Joann (Canan) Eren</b><br>Office: GITC 4212<br><br>Email: <a href="mailto:canan.eren@njit.edu">canan.eren@njit.edu</a><br>Web page: <a href="https://people.njit.edu/faculty/ce85">https://people.njit.edu/faculty/ce85</a>   |
| <b>Instructor Office Hours</b>    | Tuesday: 4:00 – 4:40 PM<br>(Office hours are not valid on the Reading day, during exam periods, holidays, and breaks)<br>If you cannot meet my office hours, send me an email to schedule an appointment.  |
| <b>Description</b>                | <p>The purpose of the course is to get better at programming in an Oracle environment, especially in PL/SQL, and to learn about different models of data, such as objects, XML, and JSON.</p> <p>This course has five parts.</p> <ol style="list-style-type: none"><li>1) Review your SQL and learn more about it.</li><li>2) Learn PL/SQL.</li><li>3) Practical ETL (Extract-Transform-Load) of data.</li><li>4) Study of a few advanced topics on databases, such as XML, OODBs, Indexing,</li><li>5) Study JSON and No-SQL databases, especially MongoDB.</li></ol> |
| <b>Course (learning) outcomes</b> | <p>At the end of the course, students will have a working knowledge of the following subjects and techniques:</p> <ul style="list-style-type: none"><li>• PL/SQL as "normal" language</li><li>• PL/SQL accessing tables</li><li>• Using Oracle SQL Developer for Oracle programming</li><li>• Extract-Transform-Load</li><li>• Inserting etc. in PL/SQL</li><li>• Object-Oriented DBs</li><li>• Objects in Oracle SQL</li></ul>  |

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|                       | <ul style="list-style-type: none"> <li>• Object-Relational DBs</li> <li>• Triggers in PL/SQL</li> <li>• HTML (brief)</li> <li>• Intro to XML</li> <li>• XML data insertion in Oracle SQL</li> <li>• Querying XML in Oracle SQL</li> <li>• Intro to JSON</li> <li>• JSON in Oracle SQL</li> <li>• No-SQL databases, esp. MongoDB</li> <li>• Intro to MongoDB use</li> <li>• Indexing in Oracle and MongoDB</li> </ul> <p>Topics are subject to change or omission, depending on time.</p>  |
| <b>Textbooks</b>      | <p><b>1) REQUIRED:</b><br/> Oracle 10g Programming: A Primer (Paperback) by Rajshekhar Sunderraman<br/> Paperback: 438 pages<br/> Publisher: Addison Wesley;<br/> Copyright: 2008<br/> ISBN: 0-321-46304-8</p> <p>If there are not enough copies in the NJIT bookstore, then please get it at <a href="http://www.amazon.com">www.amazon.com</a> or <a href="http://www.barnesandnoble.com">www.barnesandnoble.com</a>.</p> <p><b>2) WEB MATERIAL AND HANDOUTS:</b><br/> There will be handouts and reading materials that can be found on the Web.</p>   |
| <b>Grading Policy</b> | <p><b>Exams:</b><br/> There will be one midterm exam and one final exam.</p> <p><b>Homework (= Project):</b><br/> There will be four programming homework assignments covering all the material that we are studying in the class.</p> <p>Late policies will be announced together with the assignments.</p> <p><i>In general, there will be late penalties.</i></p> <p><b>Canvas Credit</b><br/> There will be Canvas Quizzes EVERY WEEK which you have to do at home. I will check EVERY WEEK whether you are keeping up with the quizzes.</p> <p><b>By the end of the semester, if you did not do all the quizzes you will get an F in the class, even if you have passing grades on all exams and all homework.</b></p> |

If you do fall behind on the Canvas quizzes by three weeks I will send you a “Warning you will fail the course” message.

If you do Canvas quizzes late, you will not get points for them. Even though you still have to do the old quizzes, because otherwise, the system does not let you access the new quizzes.

**Extra Credit**

There will be **NO** way to get extra credit. **Please don't ask.**

**Grading:**

The assignments will be graded with points from the following maxima:

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| Midterm*:               | 100 |
| Final Exam*:            | 200 |
| Programming Homework 1: | 50  |
| Programming Homework 2: | 50  |
| Programming Homework 3: | 50  |
| Programming Homework 4: | 60  |
| Canvas Quiz Credit:     | 90  |

**Total** 600

\* Exams will require appropriate software tools for exams.

**Penalty Points:**

I reserve the right to take penalty points off from students whose phones are ringing during an exam.

**Letter Grade:**

At the end of the semester, I will add up your total points and curve the results for the whole class. The department has voted on a stringent curve for all courses. Only the top 20% of the class should expect an A.

Furthermore, up to 20% of the class may face a C+, C, or F. In my experience, students getting 550 out of 600 points tend to be in the top 25%, but this is **no guarantee** for the future.

Also, note that most students typically get all the points on the Homework assignments. Thus, your position in the curve and your class grade depend almost entirely on the exams. On the other hand, missing a single homework is highly likely to lower your grade by at least one letter grade.

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|                            | <p><b>Make-up Policy:</b><br/>Exam makeup <i>after</i> missing the exam will be only allowed in extreme cases with written proof, e.g., hospital stay, car accident with the police report, and similar.</p> <p>Exam makeup due to travel may or may not be approved ahead of time and <b>never</b> after the trip. As above, trips related to an extreme emergency, e.g., death in the family, will be allowed with written proof (death announcement in a newspaper or government death certificate with <i>official</i> English translation, if from a foreign country).</p>  |
| <p><b>Computer Use</b></p> | <p><b>The Department has a Bring Your Own Device Policy. If you do not own a laptop talk to the Department Chair (or take a different class.)</b></p> <p>You have to get an AFS account (ID), if you don't have one.</p> <p>You will need a printer, Web access, AFS access, and a text editor (notepad will do). You will need fast internet access if you work from home.</p> <p>Media Services can be reached at (973) 596-3005.</p> <p><b>Canvas:</b><br/>We will use CANVAS. You will need to watch videos posted there and take quizzes there.</p> <p><b>Oracle and SQL Developer:</b><br/>You will use the Oracle database system and PL/SQL. PL/SQL is part of the normal Oracle distribution. Instructions about SQL Developer are in the class materials web page and I will talk about them in the lecture.</p> <p><b>MongoDB:</b><br/>We will use MongoDB. It is available at NJIT.</p> <p><b>Studio3T:</b><br/>We will use the Studio3T development environment as a frontend to MongoDB. The company is making it available for free to NJIT students. Find the information here:<br/><a href="https://studio3t.com/discount/education">https://studio3t.com/discount/education</a></p> <p><b>NJIT Passwords:</b><br/>If there is an NJIT password problem, try this:<br/><a href="http://myucid.njit.edu">http://myucid.njit.edu</a><br/>This is the UCID password reset.</p> |

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|                        | <p>You need a DIFFERENT password for Oracle.<br/> How do you get that different password?<br/> Go to:<br/> <a href="http://myucid.njit.edu">http://myucid.njit.edu</a></p> <p>In order to work from home on Oracle, you need to install VPN.<br/> See here: <a href="http://telecom.njit.edu/vpn/">http://telecom.njit.edu/vpn/</a></p> <p>The computer we are using is called <b>prophet.njit.edu</b><br/> The connection identifier that you will be asked for is <b>course</b>.</p> <p>Furthermore, you can get extensive explanations of the ORACLE setup by going to: <a href="http://ist.njit.edu/support/db/oracle.php">http://ist.njit.edu/support/db/oracle.php</a></p> <p><b>RESPONDUS:</b> We will use the Respondus Lockdown Browser as needed.</p>  |
| <p><b>Cheating</b></p> | <p><i>“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:</i></p> <p><a href="http://www5.njit.edu/policies/sites/policies/files/academic-integritycode.pdf">http://www5.njit.edu/policies/sites/policies/files/academic-integritycode.pdf</a>.</p> <p><i>Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. <b>Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.</b> If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at <a href="mailto:dos@njit.edu">dos@njit.edu</a>”</i></p> <p>You may "talk" about Homework assignments with each other. Where does talking end and cheating start? You may NOT copy lines of code from anybody. You may NOT use code in your program where you don't understand WHY it works, even if it works, and even if you wrote it yourself.</p> |