

# CIS 3730 Fall 2010 Final Exam Guide

## Exam format and administration

1. Scope: all topics covered in this semester with a focus on the second half of the semester. See the checklist at the end for details.
2. Exam date/time
  - a. For T/TH class: The scheduled date/time is 12/09 Thursday 8:00AM to 10:30AM. Please see <http://www.gsu.edu/es/20058.html>
  - b. For W class: we will do it in class time 12/08 W 4:30 to 7:00PM. If you have conflict in this time, please let me know ASAP. You may need to take the exam earlier or take it Thursday morning. Contact me ASAP.
3. Exam format
  - a. The exam is prepared to last 2 hours on average.
  - b. Open book, note, computer, software, everything. But you should do it yourself.
  - c. There will be multiple choices, filling in blanks, short answer questions, and exercise questions.
  - d. Most questions are task oriented.
4. Bonus: there will be some bonus points, which will be recorded separately.

## How to prepare for the exam?

1. Use the following checklist as a study guide (pay attention to the highlighted ones); read relevant chapters and lecture notes for details.
2. Review all lecture notes (slides) in each week. Get the slides from <http://jackzheng.net/teaching/cis3730>
3. Review all assignments, exercises and solutions posted.
4. Review discussions in the discussion boards.
5. Read the textbook if you have more time.
6. Have all materials and software ready beforehand. Excuses such as inaccessible materials (book, slides, exercises, etc.) will not be acceptable.
7. A review session will be set up in the 6th week. Ask all of your questions in that class.

## Knowledge Checklist (Exam Scope - pay attention to the highlighted ones)

Session/Topic	Key Concepts	Key Skills
Database Intro	<ul style="list-style-type: none"> <li>• File processing vs. database processing</li> <li>• Database, database system, and DBMS</li> <li>• Data vs. metadata (database schema)</li> <li>• Self-describing</li> <li>• Database advantages and disadvantages</li> <li>• Organizational vs. personal database system</li> <li>• Major commercial DBMS products</li> </ul>	
Relational Model	<ul style="list-style-type: none"> <li>• Relation (and its 10 features)</li> <li>• Relational model terminologies               <ul style="list-style-type: none"> <li>○ Table, row, column, record, field, attribute</li> </ul> </li> <li>• Keys               <ul style="list-style-type: none"> <li>○ Primary key, candidate key</li> <li>○ Composite key, surrogate key</li> <li>○ Foreign key</li> </ul> </li> <li>• Metadata in relational database</li> <li>• Data integrity               <ul style="list-style-type: none"> <li>○ How relational databases ensures three kinds of data integrity</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Explain why a given table is or is not a relation.</li> <li>• Identify primary keys, foreign keys, and other types of keys for a given relation.</li> </ul>

Normalization	<ul style="list-style-type: none"> <li>• Anomalies</li> <li>• Normalization and de-normalization</li> <li>• Normal forms: 1NF to 3NF</li> <li>• Functional dependency <ul style="list-style-type: none"> <li>◦ Partial dependency</li> <li>◦ Transitive dependency</li> </ul> </li> <li>• Non-key (non-prime) attribute</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the normal form of a given table.</li> <li>• Identify functional dependency among attributes.</li> <li>• Apply normalization principles to normalize a relation up to the 3<sup>rd</sup> normalization form</li> <li>• Use the text style to represent relation (table) structures.</li> </ul>
Database Design	<ul style="list-style-type: none"> <li>• Database design approach <ul style="list-style-type: none"> <li>◦ Top-down and bottom-up approach for database design</li> </ul> </li> <li>• Three-level database design method and three types of data models <ul style="list-style-type: none"> <li>◦ Conceptual design/model</li> <li>◦ Logical design/model</li> <li>◦ Physical design/model</li> </ul> </li> </ul>	
Conceptual Design and ERD	<ul style="list-style-type: none"> <li>• ERD</li> <li>• Entity, attribute and identifier</li> <li>• Relationship <ul style="list-style-type: none"> <li>◦ Cardinality</li> <li>◦ Maximum cardinality: 1:1, 1:N, N:M</li> <li>◦ Minimum cardinality: optional, mandatory</li> <li>◦ Degree <ul style="list-style-type: none"> <li>▪ Unary, binary, ternary, etc.</li> </ul> </li> </ul> </li> <li>• Crow's foot notation</li> </ul>	<ul style="list-style-type: none"> <li>• Draw simple ERD using the crow's foot notation to model simple scenarios.</li> <li>• Be able to model entity, attribute, identifier, relationship, and cardinality correctly, for binary relationships.</li> <li>• Be able to interpret simple ERDs involving the key concepts like cardinality.</li> </ul>
Logical Design	<ul style="list-style-type: none"> <li>• Relational model</li> <li>• Referential actions</li> <li>• Null value</li> </ul>	<ul style="list-style-type: none"> <li>• Transform ERD to relational models <ul style="list-style-type: none"> <li>◦ Tables, primary keys, data types, and other column constraints</li> <li>◦ Foreign key, referential actions, and other constraints</li> </ul> </li> <li>• Know how to transform three types of relationships (1:1, 1:N, N:M) and minimum cardinality.</li> <li>• Be able to use the text style of database structure representation</li> </ul>
Physical Design	<ul style="list-style-type: none"> <li>• Physical design, physical data model</li> <li>• SQL DDL</li> <li>• Table constraints and column constraints</li> <li>• Understand major data types in SQL Server 2008 database</li> </ul>	<ul style="list-style-type: none"> <li>• Based on a logical model, use SQL DDL statements to define table structures, constraints and views in SQL Server 2008 <ul style="list-style-type: none"> <li>◦ CREATE TABLE, ALTER TABLE, DROP TABLE</li> </ul> </li> </ul>
Database applications	<ul style="list-style-type: none"> <li>• Database application</li> <li>• Transact-SQL (T-SQL)</li> <li>• Stored procedure, Function</li> <li>• Database API, ODBC, JDBC, OLEDB</li> </ul>	<ul style="list-style-type: none"> <li>• Be able to use Microsoft Office (Word, Excel, Access) to connect to an SQL Server database.</li> </ul>
Database Query and SQL	<ul style="list-style-type: none"> <li>• Database query</li> <li>• SQL</li> <li>• DML, DDL, DCL</li> <li>• SQL expression</li> <li>• Table join <ul style="list-style-type: none"> <li>◦ Inner join</li> <li>◦ Outer join: left join, right join, full join</li> </ul> </li> <li>• Alias</li> </ul>	<ul style="list-style-type: none"> <li>• Write SQL SELECT statement to retrieve desired data, and know the result of a given SQL SELECT statement involving <ul style="list-style-type: none"> <li>◦ Select columns</li> <li>◦ Use selection criteria in WHERE</li> <li>◦ Comparison operators: =, &lt;, &gt;, &gt;=, &lt;=, &lt;&gt;, !=, IN, BETWEEN, LIKE, IS NULL, NOT</li> <li>◦ AND, OR</li> <li>◦ Use ORDER BY to sort results</li> <li>◦ Use table join: inner join and outer join</li> <li>◦ Expressions</li> <li>◦ Aggregate functions with groups</li> <li>◦ Sub-queries</li> <li>◦ Top, distinct, union, alias</li> </ul> </li> </ul>

XML	<ul style="list-style-type: none"> <li>• XML</li> <li>• Tree (hierarchical) structure</li> <li>• Markup, Tag, Element, Node, Attribute</li> <li>• XML schema, XML Validation</li> <li>• XML and relational database: differences and how they can work together</li> </ul>	<ul style="list-style-type: none"> <li>• Create well formed XML data files based on simple data and relational data.</li> <li>• Create XML schema and valid XML data files based on simple data and relational data.</li> <li>• Validate an XML document against a schema</li> <li>• Use the “FOR XML” clause to transform a SQL SELECT query result into an XML format: AUTO, ELEMENTS, ROOT</li> </ul>
Business Intelligence	<ul style="list-style-type: none"> <li>• Business intelligence</li> <li>• BI system components</li> <li>• Operational database vs. data warehouse</li> <li>• Data warehouse, data mart</li> <li>• Star schema</li> <li>• OLTP, OLAP, Multidimensional analysis</li> <li>• Drill up/down</li> <li>• BI reporting, Pivot table, Data mining</li> </ul>	<ul style="list-style-type: none"> <li>• Understand star schema of a data warehouse</li> <li>• Use pivot tables for multidimensional analysis</li> </ul>
SQL Server	<ul style="list-style-type: none"> <li>• SQL database engine</li> <li>• Database files</li> <li>• Tools</li> <li>• SQL Server Management Studio</li> </ul>	<ul style="list-style-type: none"> <li>• Be able to read and understand SQL Server Management Studio design interfaces, such as table design and relationship diagrams.</li> <li>• Use Configuration Manager to <ul style="list-style-type: none"> <li>○ View server/service status</li> <li>○ Start and stop service</li> </ul> </li> <li>• Use SQL Server Management Studio to <ul style="list-style-type: none"> <li>○ create/modify/delete databases, tables, columns, constraints, and views</li> <li>○ Insert, update, and delete records</li> <li>○ Create and execute SQL Select queries</li> <li>○ View, create, and modify the relationship diagram.</li> </ul> </li> <li>• Install SQL Server 2008 R2 Express</li> </ul>
Visio 2010	<ul style="list-style-type: none"> <li>• Diagram</li> <li>• Stencil</li> <li>• Shape</li> <li>• Database model diagram <ul style="list-style-type: none"> <li>○ Database properties</li> <li>○ Database driver</li> <li>○ Diagram display options</li> </ul> </li> <li>• Connection point</li> </ul>	<ul style="list-style-type: none"> <li>• Draw conceptual ERD diagram using the given stencil.</li> <li>• Set crow’s foot notations for cardinalities.</li> <li>• Draw logical database model using the database model diagram template.</li> <li>• Be able to read and understand a Visio database model diagram.</li> <li>• Define entities (tables) with columns, keys, and other constraints.</li> <li>• Define relationships with cardinalities and referential actions.</li> </ul>