

**BARUCH COLLEGE-CUNY  
ZICKLIN SCHOOL OF BUSINESS**

**CIS9340 Principles of Database Management Systems**

**Dr. Abdullah Uz Tansel**

**Fall 2020, Section: UMA (53475), Mo 6:05PM - 9:00PM**

**COURSE LOGISTICS**

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*COVID virus*

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You are welcome to see me during my office hours. If you can not see me during my office hours please talk to me or send me an email to set up a mutually good time to meet. You can reach me by email. In case you want to talk to me you can let me know it. However, email is preferable for reaching me.

You are expected to visit this course web page in BB frequently since it is a 'living document'. Before each class I will provide you notes that contain information about the assignments, term project, or lecture material. I will also post the assignments in this course web page.

**PREREQUISITE**

Prerequisite: CIS 9000

**COURSE DESCRIPTION**

This introductory graduate course provides students with the background to design, implement and use database management systems in managing the data needs of an organization. It introduces the structure, requirements, functions and evolution of database management systems. After covering conceptual data modeling and entity relationship data model the course focuses on relational data model. Students learn abstract languages such as relational algebra including their commercial implementations like SQL. Database design is introduced and discussed in detail. Concepts of data integrity, security, privacy, and concurrency control are introduced. Ethical issues in the maintenance and use of a database and globalization of information technology are also discussed. Students implement a major database application project using MS Access. Upon completion of the course students are expected to develop skills to:

- Understand the data requirements of contemporary organizations and how database management systems meet them,
- Develop conceptual data model specifications,
- Design and implement database applications,
- Understand how data is stored, retrieved and maintained in different types of databases,
- Gain experience with the existing database management systems, Relational Data Model, SQL, and Relational database design,
- Gain experience with the Transaction Processing and Concurrency Control,
- Gain experience with the NoSQL Databases, JSON Stores, Web and APIs,
- Understand legal and Ethical issues in data management.

## Learning Outcomes

1. Technology Literacy: Students will master technologies used to develop data models and deploy them in database management systems.
2. Knowledge Integration: Students will be able to analyze business requirements and address these requirements with appropriate data models and database technologies.
3. Written communication: Students will analyze a business case, and write a business database application proposal that will be implemented during the semester.
4. Oral communication: Students will present their business database solution.
5. Teamwork and Leadership: Students will work in groups to analyze a business case and write a business database application proposal that will be implemented during the semester.
6. Ethical Awareness: Students will discuss issues of privacy, ethical concerns when collecting customer data and storing them in the database, and accessing and using such data.

## TEXTBOOK

- **Required** (DS) [Database Systems: A Practical Approach to Design, Implementation and Management](#) by Thomas Connolly and Carolyn Begg. Fifth or 6th Edition. Addison Wesley Pub. Co., 2015. ISBN: 9780132943260
- **Recommended** (NPMSA ) [New Perspectives MS Office 365 & Access 2016 Comprehensive](#) by Mark Shellman and Sasha Vodnik (2016), 1st Edition. Cambridge, MA: Cengage Learning. ISBN# 13: 978-1337251457
- Microsoft Access 2016 will be used extensively for this course. [Here's why](#). MS Access 2013 and 2016 can be downloaded for free from the [Microsoft Imagine software library for Baruch](#).
- As a registered CUNY student, you are allowed to install the desktop office software on up to 5 different computers. Please visit BCTC page for more information:

<http://www.baruch.cuny.edu/bctc/software/msoffice/officeforstudents.html>  
 MS Access will only run under a Windows operating systems. For Mac users, You may use virtual machine software, such as VirtualBox, to run Windows side-by-side with MacOS. Or you may use Bootcamp utility to con\_gure/install Windows OS.

**Other resources**

(EN) R. Elmasri, S. K. Navathe, **Fundamentals of Database Systems**, Fifth Edition, Addison-Wesley, 2007.

(RU) C Ricardo, S. Urban, **Databases Illuminated**, Third Edition, John Barlett, 2017 (You can also use the second edition).

Additional course materials will be provided on course site in BB. Professor Richard Holowczak has excellent resources in his web site: [faculty course Home page](#).

**COURSE OUTLINE** - Topics to be covered in the course – Tentative

The following table gives a tentative lecture schedule for the course.

<b>Week</b>	<b>Topics</b>	<b>Chapters in DS</b>	<b>Chapters in NPMSA</b>
1	Course Introduction and Introduction to Databases	1 and 2	
2	Introduction to relational data model	5th Ed: 6 and 7 6th Ed: 4	Access Level I Tutorials
3	Introduction to Relational Algebra and SQL	5th Ed: 17 and 6 6th Ed: 5	Access Level I Tutorials
4	Structured Query Language (SQL)	5th Ed: 6 and 7 6th Ed: 6 and 7	Access Level II Tutorials
5	Structured Query Language (SQL) Continued	5th Ed: 6 and 7 6th Ed: 6 and 7	Access Level II Tutorials
6	Integrity constraints	Review notes	
7	Physical Database Design and SQL	5th Ed: 17 and 6 6th Ed: 18, 6 and 7	Access Level III tutorials
8	Structured Query Language (SQL)	5th Ed: 6 and 7 6th Ed: 6 and 7	Access Level III tutorials
9	Structured Query Language (SQL) Continued	5th Ed: 6 and 7 6th Ed: 6 and 7	Access Level III tutorials
10	Entity Relationship Modeling (E-R)	5th Ed: 11 and	Access Level III

	Modeling) and Advanced Data Modeling	12 6th Ed: 12 and 13	tutorials
11	The Relational Model and Normalization (up to BCNF) Converting E-R models to Relational Models	5th Ed: 13 and 14 6th Ed: 14 and 15 5th Ed: 16 6th Ed: 17	
12	Database Security and Administration Transaction Processing	5th Ed: 20 6th Ed: 20 5th Ed: 22 6th Ed: 22	
13	Database System Architectures: Two-tier, three-tier, Web/DBMS integration	5th Ed: 3 and 29 6th Ed: 3 and 29	
14	NoSQL DBMS, JSON Stores, Web APIs	Notes	

### **TENTATIVE GRADING**

Test	30%
Final Exam	35%
Assignments	10%
Term project	25%
<b>TOTAL</b>	<b>100%</b>

The mid-term exam covers the topics we will discuss up to, but not including, the last class before the exam. The final exam will be semi-cumulative; it will cover some topics from the first test and all the topics covered thereafter. I will not ask questions about Microsoft Access in the exams. There will be mostly problem type questions and there may be a few essay questions too.

### **ASSIGNMENTS**

There will be two types of assignments: written and Ms Access assignments. Written assignments include problems about the topics we will discuss in class.

### **TERM PROJECT**

The course requires a term project, which involves designing and implementing a database system for an organization. Students will work in teams, 3 members or less, for

the term project. If you prefer, you can work on your project individually. Students are expected to form their teams in the first two weeks of the term and select a project topic by the end of the third week. The term project involves several steps. You have to complete these steps in order since a step builds on the result of a prior step. The final project report includes all the steps and due the last class in the term. Please give me a hard copy report or an electronic copy such as a WORD document.

The term project will be implemented by using Microsoft Access or by a platform of your choice. Microsoft Access is a user-friendly database implementation tool. There are also many books available for self-study. I have included a list of books on Ms Access above. Term project details follow:

The project requires building a database application for a real-world scenario of your choosing. You will design schemas for the database, and you will create an actual database using a relational database management system. You will populate the database with sample data, write interactive queries and modifications on the database, and develop user-friendly tools for manipulating the database.

Try to pick an application that is relatively substantial, but not too enormous. For example, when expressed in the entity-relationship model, you might want your design to have in the range of four or so entity sets, and a similar number of relationships. Note that this is a ballpark figure only! You should certainly include different kinds of relationships (e.g., many-one, many-many) and different kinds of data (strings, integers, etc.

**Step 1.** Describe the database application you propose to work with throughout the course. Your description should be brief and relatively informal. If there are any unique or particularly difficult aspects of your proposed application, please point them out. Your description will be graded only on suitability and conciseness.

**Step 2** Specify an entity-relationship diagram for your proposed database. As always, don't forget to underline key attributes and include arrowheads or letters indicating the multiplicity (arity) of relationships. We will use a simple methodology to translate your E/R model to equivalent tables (relations). For each entity set create a table. Also for each many-to-many relationship create another table. A many-to-one relationship can be included in the relation that is at the many side of the relationship. A one-to-one relationship can be included in either of the related entity sets.

Later when we learn the translation methodology from E/R model to the relational model and the normalization theory you can refine your database schema and change it. Reconsider your relation schema in the light of the theory of normalization and BCNF. Remind us of your chosen database schema. For each of your current relations, tell whether its relation schema is in BCNF. If not, then either redesign your schema so the relation is in BCNF, or give a rationale for leaving in non-BCNF form (e.g., the amount of redundancy introduced is minimal, and splitting the relation would cause some reasonable queries to become multi-relational. Indicate your final choice of design, whether or not you choose to decompose one or more relations. However, this may be too late since you have already done a substantial part your project. If you elect not to

change your project please describe in your project report the changes to be done in light of what you learned in database design.

**Step 3.** The user interface of your application should be menu-driven and include a MAIN menu. It should provide the end user with the following choices at the minimum:

**Step 3a.** Data Update (insertions, deletions, and modifications)

**Step 3b.** Reports -to retrieve data from your database. The report should take the user to a submenu with options for retrieving information from any relation (by Primary/Secondary Key) or from a join of two or more relations. Develop your own retrieval possibilities depending on the particular application you have chosen. Flexibility of retrieval is desirable.

In addition to these you may come up with other choices that might also include a choice for exiting back to the operating system, WINDOWS.

The "Data Update" should take the user to a submenu with options for

- Updating (an) attribute value(s),
- Deleting a tuple (row),
- Inserting a tuple,
- Etc. in any one of the underlying relations as appropriate.

The "Reports" option of the Main Menu should take the user to a submenu of appropriate report choices that can either be displayed or printed. Try to include a chart or graph in your report derived from the data stored in the database.

Feel free to use the Command Language, Report Generator, Forms Generator, Applications Generator, SQL and any other facilities of the database system (Microsoft Access) in completing your application.

This project has the sole aim of giving you an opportunity to take a real world situation and implement a database application. However simple it may be, model it as a database and develop an implementation for it that might even be actually used profitably. In other words, make it as realistic as possible.

The specifications of the project are too loose on purpose, so that you can exercise a substantial amount of personal innovations and creativeness to the extent that the limited time you have allows it.

**Some suggested applications are:**

- a) Banking (Accounts, Customers, Borrowing, Deposits),
- b) Library Circulation Systems (Library Materials, Readers, and Borrowing),
- c) Stocks Market Brokerage Houses (Stocks, Customers, Portfolios),
- d) Football Federation License Records (Football Players, Football clubs, Licenses),
- e) Doctors office system (Patients, Treatments, Prescriptions),
- f) Car Insurance Application. (Customers, Policies, and Claims),
- g) Dental office,
- h) Restaurant,
- i) Tracking web accesses or collecting data on the web,
- j) COVID tracking, Etc.

Of course, you are welcome to come up with your own application ideas.

## **WORK SUBMISSION STANDARDS and ACADEMIC INTEGRITY**

Students are reminded of the Baruch College guidelines that relate to the integrity of student behavior regarding submissions and assignments. In assignments you can talk one another – which is desirable- to learn the material better. However each student should submit his/her original work. You are not allowed to see and copy from the solutions to exams and assignments provided in the prior terms. **The penalty for cheating is immediate failure in this course.**

Group submissions are to reflect the original work of all teammates. Students will be required to submit a memo attesting to that fact with all submissions of work. Furthermore, each teammate's relative contribution in group assignments will be evaluated.

Behavior during exams is expected to conform to Baruch College guidelines. No further warnings will be given prior or during the exams. Incidents of improper behavior (any form of cheating or communications with other students) will result in a course grade of 'failure', and referral of the matter to the appropriate Dean of Students.

### **Students with Disabilities**

We have a process at Baruch for determining whether a student who identifies as disabled is eligible for reasonable accommodations in order to complete the student's academic program. We strive to ensure that no student with a disability is discriminated against and that none is denied participation in College programs and activities for lack of reasonable accommodations.

Some people think that a disability has to be visible to be accommodated. This is not the case. There are many disabilities – diabetes, psychological illness, learning disabilities, AIDS, seizure disorders, arthritis, etc., – that require accommodations. Examples of possible accommodations include additional testing time; adaptive equipment; and taping of classes.

If you feel that you may need a reasonable accommodation based on a disability, please contact the staff at the Office of Disability Services, (<https://studentaffairs.baruch.cuny.edu/student-disability-services/>).

**Recording of Remote Classes:** As is the case with many colleges and universities that have chosen online and distance learning modalities as a result of the COVID-19 pandemic, faculty utilizing Zoom, Blackboard Collaborate and other digital technology to deliver course curriculum/material must be sensitive to issues of privacy. To that end, faculty offering classes through web conferencing digital technology like Zoom must not record a student in a class session without the student's consent. Similarly, CUNY discourages students from recording the sessions unless such recording is part of a reasonable accommodation under the law or is not prohibited by campus policy. To obtain consent, faculty who wish to record their class sessions must provide the following announcement, in emails, and/or class syllabus, to enrolled students and verbally at the opening of the first class session:

*Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.*

As mentioned in the announcement, recording of classes is for the benefit of students. Faculty shall not use class recordings as a means of determining class attendance and are reminded that CUNY is classified by the U.S. Department of Education as a non-attendance taking institution. Doubts faculty may have regarding the identity of participants should be alleviated if faculty offer their classes through applications and resources that have been licensed by CUNY Central or their college and require a CUNY/College ID for login, thereby giving reasonable assurance that participants are CUNY students.

For the avoidance of doubt, the prohibition on recording without consent does not apply to audio or video lectures of the faculty member only and that do not include a student participation component.

## **MISCELLANEOUS**



Depending on our progress in class I may arrange one or two lab sessions on Access to help students having difficulty in learning Ms Access. Tutoring will be available for Ms Access. Hours and location will be announced when the term begins.

Students are expected to spend significant time outside of the classroom learning to use Ms Windows and Ms Access 2010. It is assumed students know how to run multiple programs at the same time, make backups of their work on storage devices, cut/copy and paste text and images between applications, and how to work with the accessories that come with Ms Windows such as a Web Browser (Internet Explorer or Firefox or Google Chrome), Windows Explorer (file management), Ms Paint, Notepad and WordPad. If you feel you are lacking these skills, please acquire them either on your own or via one of the fundamental courses you can also get help from the course tutor.

All the books, the textbook as well as the books listed as additional references will be available in the reserve section of Newman Library.