Syllabus

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Course Overview and Description

This module is also available as a concatenated page, suitable for printing or saving as a PDF for offline viewing.

MET CS779

Advanced Database Management

This course uses the latest database tools and techniques to prepare the student to understand, develop, and manage advanced database applications. Students gain considerable hands-on experience with the Oracle family of databases and an understanding of how to define, design, and implement databases. Students learn how to use object-oriented technologies to design relational databases and how to design relational databases to support object-oriented applications. Students learn about database programming and develop triggers, stored procedures, and stored functions using Oracle's PL/SQL language or the TransactSQL language of Microsoft SQL Server. The students learn about database administration and perform common database administration functions, such as creating and modifying users, managing privileges, and managing tablespaces. The students learn how to prevent, identify and correct database performance problems and learn the basics of modern database storage, including RAID and SAN. With the support of faculty, students get to define and develop their own term project using any advanced database technology. Students present these projects to the class using web multimedia technology. The topics covered in the course include:

- Advanced normalization
- Programming triggers and stored procedures in PL/SQL
- Distributed database architecture and design
- Distributed transactions
- Object and object-relational DBMS with Oracle examples
- ROLAP and MOLAP data warehouse architectures
- Dimensional database design

- Data mining and business intelligence
- NoSQL data models for big data
- Database administration and more advanced physical design
- Tuning database parameters, schemas, and SQL
- Storage for databases, including hard drives, RAID, and storage area networks

Technical Notes

The table of contents expands and contracts (+/- sign) and may conceal some pages. To avoid missing content pages, you are advised to use the next/previous page icons in the top right corner of the learning modules.

This course requires you to access files such as word documents, PDFs, and/or media files. These files may open in your browser or be downloaded as files, depending on the settings of your browser.

Course Objectives

Each of the first six weeks of the course includes reading assignments, lectures, hands-on Oracle exercises, discussion questions, review questions, and a quiz. The last week is structured to allow you to get any remaining questions answered, wrap up your term projects, and prepare for the final exam.

Exercises help you learn the material. Since students have different learning needs it is not optimal to have one set of required exercises for all students. The exercises are therefore designed with as much flexibility as possible. In addition:

- You may make up your own exercises and submit them with your solutions to your instructor for feedback.
- If your instructor can support it, you may resubmit your exercises to your facilitator to see if you successfully addressed the feedback from your previous submission(s). Your grade for an exercise should reflect your last submission, occasionally with a little deduction for situations where you merely incorporate material provided by your instructor. There is no penalty for late exercise submissions. Be aware that your instructor will be very busy grading term projects late in the term, so exercises submitted or resubmitted late in the term may not be graded in time to count on your grade.
- You may ask your instructor or facilitator for exercises in particular areas where you feel it would be beneficial for you.

Goals

You will understand and be able to use the advanced database technology required for large data, high performance, and complex databases, including designing and tuning for scalable performance.

You will understand decision support database technology, particularly dimensional ROLAP.

You will understand the roles and technology of databases for big data and the internet.

You will understand the roles of database administration in the enterprise and be able to perform common database administration functions.

Learning Outcomes

By successfully completing this course, you will be able to:

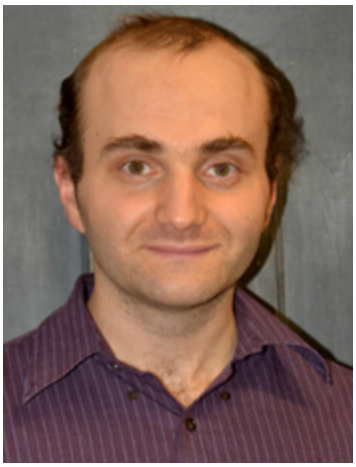
- Identify and correct Boyce-Codd and 4th normal form normalization problems.
- Identify and correct over-normalization problems.
- Design correct denormalizations that improve performance.
- Develop and use stored procedures, functions, and triggers with Oracle's PL/SQL.
- Explain the factors that influence distributed query performance and the different techniques for query optimization.
- Design distributed databases, including those that perform replication; vertical, horizontal, and mixed partitioning; and data allocation.
- Explain the concepts of object-oriented databases and when object-oriented databases are appropriate.
- Explain the fusion of relational and object-oriented models and use the ANSI SQL 2003 object-relational features in Oracle and similar features in other modern object-relational DBMS.
- Explain the concepts of consistency, availability and partition tolerance (CAP) in distributed databases.
- Explain the scaling limitations of relational databases and when it could be desirable to move to non-relational (NoSQL) solutions.
- Describe the design models of non-relational databases.
- Describe the main features of common non-relational databases, such asMongoDB, Neo4j, BigTable, and DynamoDB.
- Explain the roles of decision support databases in enterprises.
- Clearly identify and distinguish facts, dimensions, attributes, and attribute hierarchies and their roles in drill-down and roll-up.
- Design, develop, and use star, snowflake, and constellation dimensional data mart and data warehouse databases.
- Explain the relationships between data, information, and knowledge.
- Explain the roles of data, databases, and database management in an organization.
- Perform common database administration functions on Oracle.

Learning in this Class

I measure the success of this class by how well it helps you reach your educational and professional goals in the advanced database areas.

- Advanced database technology includes far too much to cover it all in this class. I have identified the core areas, but there is much more useful material.
- The class has an independently defined term project and extra credit projects to enable you to cover what you need in specialized areas.
- Please let me know what else you want to cover in this class. If your topic is of general interest, I will try to post additional material and provide references.

Instructor



Jack Polnar

jpolnar@bu.edu

Office Hours and Questions: I welcome your questions via Online Campus Internal Messages, Discussion area or standard email which I pick-up several times a day. I will also conduct multiple Supplementary Live Sessions each week and welcome your questions there. We can also arrange time to meet one on one through a live office, or a phone call.

My name is Jack Polnar and I will be your instructor for CS779. Our team of facilitators and I welcome the opportunity to teach, guide and interact with you through the next 6–7 weeks of fast paced learning of Advanced Database Management. In this course we will explore various advanced database topics beginning with relational design, programming and tuning, and then explore various topics such as Object Relational Design, Data Warehousing and Big Data among many, including challenges and approaches, both conceptually, and hands on. My goal in this course is to show you what it's like to be in the role of a database programmer and designer, as well as explore and understand various advanced database topics.

I received my master's degree in Computer Information Systems with Security Concentration from Boston University MET in 2008. I have taken this course as a student once, just like you are now! I have been teaching,

facilitating and helping develop courses here at BU MET Online program since Spring 2006 starting with this exact course! In addition to CS779, I have also been heavily involved with several other courses including CS682, CS684, CS669, CS699 and CS782. Professionally I have close to 20 years of database management and programming experience, specifically on SQL Server and MySQL.

Course Developers

Robert Schudy, PhD

Professor Robert Schudy originally developed this course. Dr. Schudy received his doctorate in computer science from the University of Rochester. He has conducted research and developed systems at Hewlett Packard Laboratories (where he initiated or assisted in the bubble jet, laser printer, and RISC/Unix areas), Bolt Beranek and Newman (where he pioneered intelligent aircraft systems and autonomous air vehicles). He has served as chief scientist for startups and has architected designed and managed the development of many computer systems.

Contributions to the course provided by Jack Polnar. Jack Polnaris part time faculty at Boston University's Metropolitan College Computer Science department. He received his master's degree in Computer Information Systems from Boston University's Metropolitan College. He has 20 years experience within government information technology, predominantly within systems analysis and database management. Jack Polnar was the 2018 recipient of BU MET's Roger Deveau Part-Time Faculty Award for Excellence in Teaching.

Study Guide

This course starts on a **Tuesday**. The modules in this course run from **Tuesday to Monday**.

Live Classroom Sessions

There will be synchronous Live Classroom discussions that will be announced during the course. These sessions will be archived for further viewing. In order to participate in these discussions or to access the archived sessions, you will need to go to the Live Classrooms/Offices links.

Module 0.1 Study Guide and Deliverables

Readings: In this module we review SQL, traditional normalization, and the basics of database programming. The readings cover additional database programming, to prepare you for the more advanced database programming in Module 1.

You may read Connolly and Begg (CB6) chapters 1–12, 14, and 16–18 for review.

Module 0.2 Study Guide and Deliverables

Readings: In this module we review some of the important facets of executive writing.

You may view several videos and access slides to use as a checklist for your assignment submissions for this course.

Module 1 Study Guide and Deliverables

Readings: Primary Reading (Coronel, 14th Ed):

- Background Concepts on Relational Modeling and Normalization: Chapter 4 – Entity Relational Modeling, Chapter 5 section 3 on Primary Keys, Chapter 6 – Normalization
- Background concepts on SQL: Chapter 7 and Chapter 8
- Background concepts on OLAP Chapter 13-6, 13-8 on Analytic Functions

	• Appendix A – Using Lucidchart
Assignments:	• Assignment 1.0, due Wednesday, January 24 at 6:00 AM ET • Programming Part 1, due Sunday, January 28 at 6:00 AM ET • Programming Part 2 due Sunday, February 4 at 6:00 AM ET
Assessments:	• Crediting Sources Tutorial Self-Assessment due Wednesday, January 24 at 6:00 AM ET
Term Project Note:	Term Project Update #1, is due Wednesday, January 31 at 6:00 AM ET. During this first module you should begin to think about what you will be doing for your term project and discuss your ideas with your instructor. Your term project can be based on any advanced database topic, including but not limited to XML and databases, database performance measurement or tuning, advanced non-relational databases, decision support databases, data mining, distributed databases, object-oriented databases, object-relational databases, tiered databases, very large databases, or advanced database architectures.

Live Classrooms:	Supplementary Live Session, Tuesday, January 16, 8:00 PM - 10:00 PM ET Current week's assignment review and examples, Wednesday, January 17, 8:00 PM - 9:00 PM ET SQL Review, Saturday, January 20, 10:00 AM - 12:00 PM (noon) ET Live office help, Monday, January 22, 8:00 PM - 8:45 PM ET

Module 2 Study Guide and Deliverables

Readings: Primary Reading (Coronel, 14th Ed):

- Background Concepts on Performance Tuning: Chapter 11
- Background Concepts on Backup and Recovery Chapter 9-3d , 9-3f on maintenance

Assignments:

- Assignment 2.0 due Thursday, February 8 at 6:00 AM ET

Term Project Note:	Term Project Update #2, is due Sunday, February 11 at 6:00 AM ET. During this module you should finalize the definition of your project, working with your instructor. You should develop a project definition document with a project plan, and should obtain approval for this project. Your updated term project concept can be different than the

concept submitted for the Module 1 Term Project Proposal. Still, it is risky to change your term project concept after this module, because you may not have sufficient time to complete your project.

Live Classrooms: Supplementary Live Session, Tuesday, January 23, 8:00 PM - 10:00 PM ET

Current week's assignment review and examples, Wednesday, January 24, 8:00 PM - 9:00 PM ET

Live office help, Saturday, January 27, 10:00 AM - 11:30 AM ET

Live office help, Monday, January 29, 8:00 PM - 8:45 PM ET

Module 3 Study Guide and Deliverables

Readings: Primary Reading (Coronel, 14th Ed):

- Background Concepts on Transaction Management: Chapter 10
- Background Concepts on Distributed Databases: Chapter 12
- Background Concepts on Cloud Computing Services: Chapter 15 -4

Assignments:

- Assignment 3.1 due Wednesday, January 31 at 6:00 AM ET
- Assignment 3.0 due Wednesday, February 14 at 6:00 AM ET

Term Project Note: Term Project Update #3, is due Sunday, February 18 at 6:00 AM ET.

This term project deliverable may include an update of your project plan or any other portions of your term project. The purpose of this deliverable is to provide your instructor with an opportunity to guide you midway in your term project.

Live Classrooms: Supplementary Live Session, Tuesday, January 30, 8:00 PM - 10:00 PM ET

Current week's assignment review and examples, Wednesday, January 31, 8:00 PM - 9:00 PM ET

Live office help, Saturday, February 3, 10:00 AM - 11:30 AM ET

Live office help, Monday, February 5, 8:00 PM - 8:45 PM ET

Module 4 Study Guide and Deliverables

Readings: Primary Reading (Coronel, 14th Ed):

- Background Concepts on BI and Data Warehousing Chapter 13 sections 1 through 5, 13-9, 13-10

- Background Concepts on XML 15-3

Assignments: Assignment 4 due Sunday, February 18 at 6:00 AM ET

Term Project Note: During this module you should complete much of the implementation of your project, including writing most of your research paper. You should provide evidence of progress to your instructor, who will review it and provide guidance.

Live Classrooms: Supplementary Live Session, Tuesday, February 6, 8:00 PM - 10:00 PM ET

Current week's assignment review and examples, Wednesday, February 7, 8:00 PM - 9:00 PM ET

Live office help, Monday, February 12, 8:00 PM - 8:45 PM ET

Module 5 Study Guide and Deliverables

Readings: Primary Reading (Coronel, 14th Ed):

- Background Concepts on Big Data Chapter 14
- Background Concepts on Appendix P Working with MongoDB (Appendix P) and Jeo4G (Appendix Q)

Assignments: Assignment 5 due Wednesday, February 21 at 6:00 AM ET

	You may choose to submit Assignment 5.0 or Assignment 5.1 for your grade. You may also submit the other assignment for extra credit.
Term Project Note:	During this module you should be finishing the technical implementation of your term project and completing the term paper and presentation. You are encouraged to present your partially completed project products to your facilitator for feedback before the final delivery.
Live Classrooms:	Supplementary Live Session, Tuesday, February 13, 8:00 PM - 10:00 PM ET Current week's assignment review and examples, Wednesday, February 14, 8:00 PM - 9:00 PM ET Live office help, Monday, February 19, 8:00 PM - 8:45 PM ET

Module 6 Study Guide and Deliverables

Readings:	None
Assignments:	Extra Credit Assignment 6 due Sunday, February 25 at 6:00 AM ET
Term Project Deliverable:	If you have not already done so, during the last module you should complete your project presentation and report and submit them to your facilitator by the dates that you and your facilitator have chosen. There

	are three separate dropboxes where you can submit your Term Projects—one is for your presentations, one for your reports, and one is for your source code or other supporting data. There is considerable flexibility in the particular deliverables, depending on the design of your term project, so your approved project proposal and plan may not have all of these deliverables. I have provided three dropboxes to accommodate the full range of possible deliverables. I do require that everyone have a presentation covering the central aspects of their term project in a form that their classmates, facilitator and I can experience, and that you submit a presentation document or a document containing a link and instructions—in the term project presentation dropbox. Everything should be submitted by Tuesday, February 27 at 6:00 AM ET.
Course Evaluation:	Course Evaluation opens on **Monday, February 26 at 10:00 AM ET** and closes on **Sunday, March 3 at 11:59 PM ET**. Please complete the course evaluation. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students.
Live Classrooms:	Supplementary Live Session, Tuesday, February 20, 8:00 PM -

10:00 PM ET

Final Exam Details

The final exam is a proctored exam available from **Wednesday, February 28 at 6:00 AM ET to Saturday, March 2 at 11:59 PM ET**. The Computer Science department requires that all final exams be administered using an online proctoring service called Examity that you will access via your course in Blackboard. In order to take the exam, you are Primary to have a working webcam and computer that meets Examity's system requirements. A detailed list of those requirements can be found on the How to Schedule page. Additional information regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment within the defined exam window.

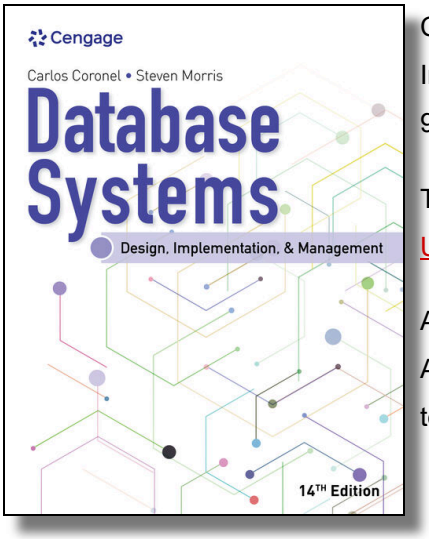
The Final Exam will be **open book/open notes (but no generative AI)** and is accessible only during the final exam period. You can access it from the Assessments section of the course. Your proctor will enter the password to start the exam.

Final Exam duration: **three hours**

The exam features a combination of multiple-choice, multiple-response, matching, short answer, and short essay questions.

Course Materials

Required Books

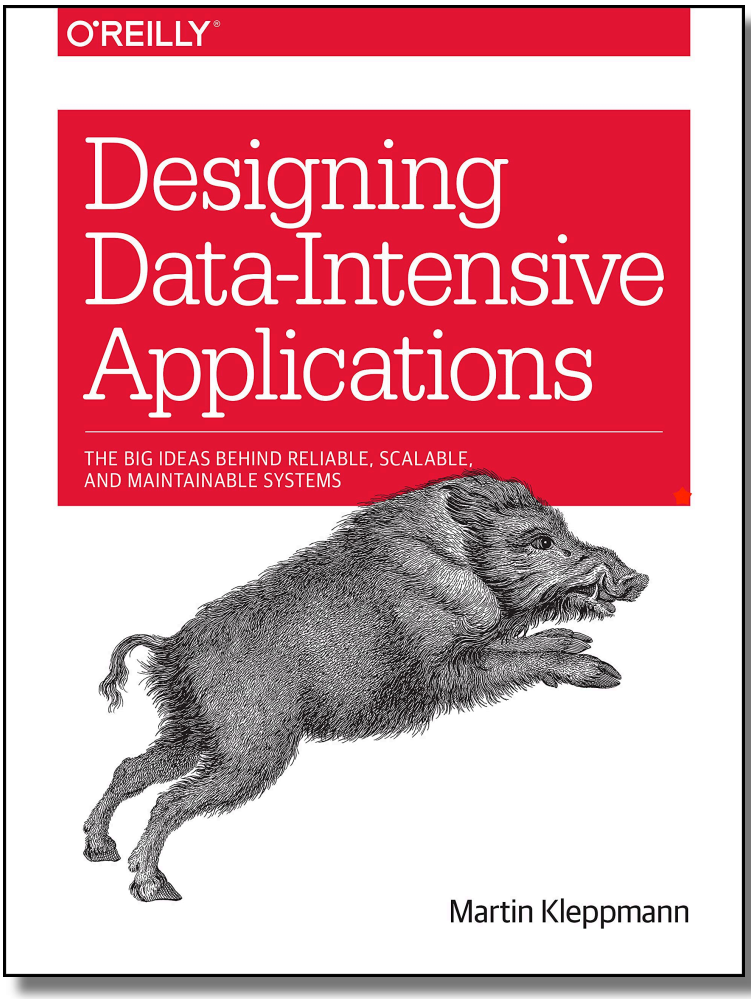


Coronel, C., & Morris, S. (2023). Database Systems: Design, Implementation, & Management (14th ed.). Cengage Learning. ISBN: 9780357673034

This textbook can be purchased from Barnes & Noble at Boston University.

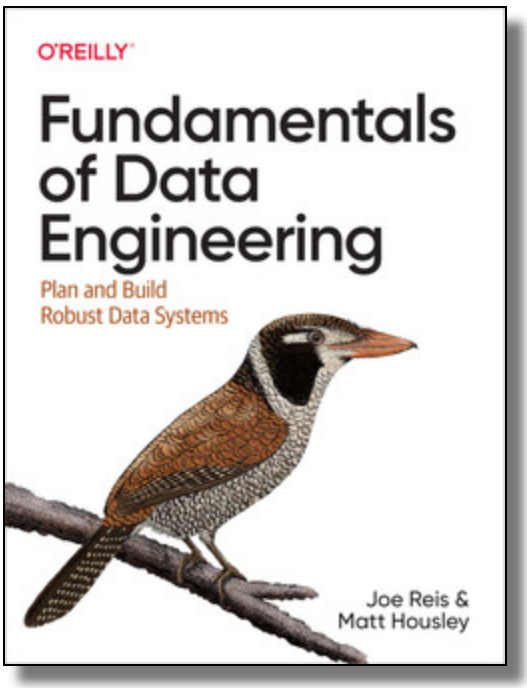
An e-book is available at Vitalsource.com. An e-book is available through Amazon. The MindTap software, which comes with some versions of this text, is not required.

Recommended Books



Kleppmann, M. (2017). Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems. O'Reilly Media. ISBN 9781449373320.

An e-book is available at Vitalsource.com. An e-book is available through Amazon.



Reis, J., & Housley, M. (2022). Fundamentals of Data Engineering: Plan and Build Robust Data Systems. O'Reilly Media. ISBN 9781098108304.

An e-book is available at Vitalsource.com. An e-book is available through Amazon.

Purchasing Textbooks

There are no required textbooks for this course, but the optional recommended textbooks can be purchased from Barnes and Noble at Boston University. Be aware that some of our students have experienced month-long delays when ordering texts from deep discount web-based vendors. The BU Bookstore stocks the texts, can get them to you quickly, and often has used copies of these texts for a reduced rate.

Required Software

This course supports Oracle, Microsoft SQL Server (MSSQL), and we are building capacity for PostgreSQL. Detailed step-by-step instructions for downloading and installing Oracle, SQL Server, and PostgreSQL are provided in the "Resources" section below. If you choose to use a cloud based DBMS platform from Oracle, SQL Server (Azure), or for postgreSQL, please note that there may be certain limitations and costs, however an advantage is fast deployment and cloud-based experience.

Oracle Resources

- Oracle Installation Guide
- Oracle Express Installation Guide

Microsoft SQL Server Resources

- Microsoft SQL Server 2019 Installation Guide
- Microsoft SQL Server Express Installation Guide

PostgreSQL Resources

- PostgreSQL Installation Guide

Live Classroom Discussions and Archives

There will be synchronous Live Classroom discussions that will announced during the course. These sessions will be archived for further viewing. Your participation, while not mandatory, will be valuable to you and the entire class. In order to participate in these discussions or to access the archived sessions, you will need to go to the Live Classroom links.

Boston University Library Information

Boston University has created a set of videos to help orient you to the online resources at your disposal. An introduction to the series is below:

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All of the videos in the series are available on the Online Library Resources page, which is also accessible from the Campus Bookmarks section of your Online Campus Dashboard. Please feel free to make use of them.

As Boston University students, you have full access to the BU Library. From any computer, you can gain access to anything at the library that is electronically formatted. To connect to the library, use the link http://www.bu.edu/library. You may use the library's content whether you are connected through your online course or not, by confirming your status as a BU community member using your Kerberos password.

Once in the library system, you can use the links under “Resources” and “Collections” to find databases, eJournals, and eBooks, as well as search the library by subject. Some other useful links follow:

Go to Collections to access eBooks and eJournals directly.

If you have questions about library resources, go to Ask a Librarian to email the library or use the live-chat feature.

To locate course eReserves, go to Reserves.

Please note that you are not to post attachments of the required or other readings in the water cooler or other areas of the course, as it is an infringement on copyright laws and department policy. All students have access to the library system and will need to develop research skills that include how to find articles through library systems and databases.

Free Tutoring Service

Free online tutoring services by Tutor.com are available to BU online students for the duration of their eligible online course. Tutor.com is a web- based service that provides an online writing lab and access to on-demand and scheduled tutoring sessions for writing, math, business, coding languages, and other subjects. Students can submit a question to a tutor, submit a paper for feedback about writing and grammar, or schedule a live session with a tutor.

You can log in directly to Tutor.com from Blackboard Online Campus by clicking the link in the left-hand navigation menu within your online course. All activity in the Tutor.com classroom is recorded for learner review and quality control. Transcripts will be available afterward in My Account under My Locker in your Tutor.com account.

Please Note

Tutor.com services may be used only for current Boston University online courses and career services. Use of this service for purposes other than current coursework or career services may result in deactivation of your Tutor.com account.

Course Grading Structure

Please check the **Study Guide** in the syllabus for Live Classroom dates and specific due dates for assignments and assessments.

The course is conducted by means of a sequence of readings from the textbooks, lectures in text and graphic form, exercises, and quizzes. There are one or more lectures per module.

Graded Items:

- **Assignments**: There are assignments due each module. You submit the assignment in the "Assignments" area.
- **Term Project**: There is a term project that you will define and develop with the help of your facilitators and myself. There are weekly milestones to help you stay on schedule and to help your facilitator and professor guide you as you work on your project. You submit each piece of the term project in the "Assignments" area.
- **Final Exam**: There will be a proctored Final Exam in this course using a proctor service called Examity. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment.

Ungraded Items:

- **Quizzes**: There is a quiz ("Review Questions") in each module covering the module materials. They are not graded. You are encouraged to take the Questions as often as you wish to help you practice your skills.
- **Ungraded Discussion Forums:** There are ungraded discussion forums throughout the course. You are encouraged to share your knowledge and learn from your peers.
- **Live classroom sessions:** Live classroom sessions will be offered during this course. Days/times will be posted in the announcements area. Students are not required to attend and recordings will be provided when possible.

Grading Policy

All students will be expected to demonstrate database knowledge and techniques. Your professor may in exceptional circumstances, such as disabilities, modify these distributions to more accurately reflect a student's performance in the course.

Grading Scheme	
Assignments	34%
Term Project	33%
Final Exam	33%

Grade	**Numeric Grade Range**	**Grade Points**
A	≥ 95	4.0
A−	≥ 90 < 95	3.7
B+	≥ 87 < 90	3.3
B	≥ 83 < 87	3.0
B−	≥ 80 < 83	2.7
C+	≥ 77 < 80	2.3

C	≥ 73 < 77	2.0
C−	≥ 70 < 73	1.7
D	≥ 60 < 70	1.0
F	< 60	0

Expectations

You are expected to communicate proactively with your facilitator and team members. Especially for group projects, delays will impact other team members' work, so extra sensitivity towards your virtual teammates is appreciated.

Delays

All assignments must be completed. We understand that it is sometimes not possible for students to submit their assignments by the deadline, and we make every effort to accommodate our typically very busy students' schedules. We recognize that students with crunch times at work or other things that keep them from submitting their work on time are already at a disadvantage, so we allow late submissions without penalty, provided that you communicate your situation to us and your facilitator can grade them on time. In practice, your facilitator will be very busy grading your term projects near the end of the term, so it may not be possible to grade assignments submitted more than one week late near the end of the term; these may count as a zero in your course grade. For this reason, be sure to communicate with your facilitator, preferably in advance, if you need to submit your assignments late.

Academic Conduct Policy

Please visit Metropolitan College's website for the full text of the department's *Academic Conduct Code*.

A Definition of Plagiarism

> “The academic counterpart of the bank embezzler and of the manufacturer who mislabels products is the plagiarist: the student or scholar who leads readers to believe that what they are reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone’s mind, there would

be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. But it is apparent that sometimes people of goodwill draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of “borrowing” and of the procedures for correct identification of materials other than those gained through independent research and reflection.”

“The spectrum is a wide one. At one end there is a word-for-word copying of another’s writing without enclosing the copied passage in quotation marks and identifying it in a footnote, both of which are necessary. (This includes, of course, the copying of all or any part of another student’s paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so aptly expresses one’s opinion that one is tempted to make it personal property.”

“Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit-but more the result, perhaps, of laziness than of bad intent-is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people’s ideas and words, the writer’s sole contribution being the cement to hold the pieces together. Indicative of more effort and, for that reason, somewhat closer to honest, though still dishonest, is the paraphrase, and abbreviated (and often skillfully prepared) restatement of someone else’s analysis or conclusion, without acknowledgment that another person’s text has been the basis for the recapitulation.”

The paragraphs above are from H. Martin and R. Ohmann, *The Logic and Rhetoric of Exposition, Revised Edition.* Copyright 1963, Holt, Rinehart and Winston.

Academic Conduct Code

I. **Philosophy of Discipline**

The objective of Boston University in enforcing academic rules is to promote a community atmosphere in which learning can best take place. Such an atmosphere can be maintained only so long as every student believes that his or her academic competence is being judged fairly and that he or she will not be put at a disadvantage because of someone else’s dishonesty. Penalties should be carefully determined so as to be no more and no less than required to maintain the desired atmosphere. In defining violations of this code, the intent is to protect the integrity of the educational process.

II. **Academic Misconduct**

Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments, or impedes other students’ opportunities of being judged fairly for their academic work.

Knowingly allowing others to represent your work as their own is as serious an offense as submitting another's work as your own.

III. **Violations of this Code**

Violations of this code comprise attempts to be dishonest or deceptive in the performance of academic work in or out of the classroom, alterations of academic records, alterations of official data on paper or electronic resumes, or unauthorized collaboration with another student or students. Violations include, but are not limited to:

A. **Cheating on examination**. Any attempt by a student to alter his or her performance on an examination in violation of that examination's stated or commonly understood ground rules.
B. **Plagiarism.** Representing the work of another as one's own. Plagiarism includes but is not limited to the following: copying the answers of another student on an examination, copying or restating the work or ideas of another person or persons in any oral or written work (printed or electronic) without citing the appropriate source, and collaborating with someone else in an academic endeavor without acknowledging his or her contribution. Plagiarism can consist of acts of commission-appropriating the words or ideas of another-or omission failing to acknowledge/document/credit the source or creator of words or ideas (see below for a detailed definition of plagiarism). It also includes colluding with someone else in an academic endeavor without acknowledging his or her contribution, using audio or video footage that comes from another source (including work done by another student) without permission and acknowledgement of that source.
C. **Misrepresentation or falsification of data** presented for surveys, experiments, reports, etc., which includes but is not limited to: citing authors that do not exist; citing interviews that never took place, or field work that was not completed.
D. **Theft of an examination**. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.
E. **Unauthorized communication during examinations**. Any unauthorized communication may be considered prima facie evidence of cheating.
F. **Knowingly allowing another student to represent your work as his or her own**. This includes providing a copy of your paper or laboratory report to another student without the explicit permission of the instructor(s).
G. **Forgery, alteration, or knowing misuse of graded examinations, quizzes, grade lists, or official records of documents**, including but not limited to transcripts from any institution, letters of recommendation, degree certificates, examinations, quizzes, or other work after submission.
H. **Theft or destruction of examinations or papers** after submission.
I. **Submitting the same work in more than one course** without the consent of instructors.
J. **Altering or destroying another student's work or records**, altering records of any kind, removing materials from libraries or offices without consent, or in any way interfering with the work of others so as to impede their academic performance.
K. **Violation of the rules governing teamwork**. Unless the instructor of a course otherwise specifically provides instructions to the contrary, the following rules apply to teamwork: 1. No team

member shall intentionally restrict or inhibit another team member's access to team meetings, team work-in-progress, or other team activities without the express authorization of the instructor. 2. All team members shall be held responsible for the content of all teamwork submitted for evaluation as if each team member had individually submitted the entire work product of their team as their own work.

L. **Failure to sit in a specifically assigned seat during examinations.**
M. **Conduct in a professional field assignment that violates the policies and regulations of the host school or agency.**
N. **Conduct in violation of public law occurring outside the University that directly affects the academic and professional status of the student, after civil authorities have imposed sanctions.**
O. **Attempting improperly to influence the award of any credit, grade, or honor.**
P. **Intentionally making false statements to the Academic Conduct Committee or intentionally presenting false information to the Committee.**
Q. **Failure to comply with the sanctions imposed under the authority of this code.**

Important Message on Final Exams

Dear Boston University Computer Science Online Student,

As part of our ongoing efforts to maintain the high academic standard of all Boston University programs, including our online MSCIS degree program, the Computer Science Department at Boston University's Metropolitan College requires that each of the online courses includes a proctored final examination.

By requiring proctored finals, we are ensuring the excellence and fairness of our program. The final exam is administered online.

Specific information regarding final-exam scheduling will be provided approximately two weeks into the course. This early notification is being given so that you will have enough time to plan for where you will take the final exam.

I know that you recognize the value of your Boston University degree and that you will support the efforts of the University to maintain the highest standards in our online degree program.

Thank you very much for your support with this important issue.

Regards,

Professor Lou Chitkushev, Ph.D.
Associate Dean for Academic Affairs
Boston University Metropolitan College

Microsoft Azure Dev Tools for Teaching

Microsoft Azure Dev Tools for Teaching is a Microsoft program that supports technical education by providing access to Microsoft software for learning, teaching, and research purposes. Our membership allows faculty and students currently enrolled in MET courses to obtain certain Microsoft products free of charge. All MET students are granted access to download the software for the duration of their study at MET College.

FAQ and basic information are at Microsoft Azure Dev Tools for Teaching, (You may have to enter your personal BU login credentials to access this page.)

Who's Who: Roles and Responsibilities

You will meet many BU people in this course and program. Some of these people you will meet online, and some you will communicate with by email and telephone. There are many people behind the scenes, too, including instructional designers, faculty who assist with course preparation, and video and animation specialists.

People in Your Online Course in Addition to Your Fellow Students

Your Facilitator. Our classes are divided into small groups, and each group has its own facilitator. We carefully select and train our facilitators for their expertise in the subject matter and their excellence in teaching. Your facilitator is responsible for stimulating discussions in pedagogically useful areas, for answering your questions, and for grading homework assignments, discussions, term projects, and any manually graded quiz or final-exam questions. If you ask your facilitator a question by email, you should get a response within 24 hours, and usually faster. If you need a question answered urgently, post your question to one of the urgent help topics, where everyone can see it and answer it.

Your Professor. The professor for your course has primary responsibility for the course. If you have any questions that your facilitator doesn't answer quickly and to your satisfaction, then send your professor an email in the course, with a cc to your facilitator so that your facilitator is aware of your question and your professor's response.

Your Lead Faculty and Student Support Administrator, Jennifer Sullivan. Jen is here to ensure you have a positive online experience. You will receive emails and announcements from Jen throughout the semester. Jen represents Boston University's university services and works for BU Virtual. She prepares students for milestones such as course launch, final exams, and course evaluations. She is a resource to both students and faculty. For example, Jen can direct your university questions and concerns to the appropriate party. She also

handles general questions regarding Online Campus functionality for students, faculty, and facilitators, but she does not provide tech support. She is enrolled in all classes and can be contacted within the course through Online Campus email as it is running. You can also contact her by external email at jensul@bu.edu or call (617) 358-1978.

People Not in Your Online Course

Although you will not normally encounter the following people in your online course, they are central to the program. You may receive emails or phone calls from them, and you should feel free to contact them.

Your Computer Science Department Online Program Coordinator, Annie Imperato. Annie administers the academic aspects of the program, including admissions and registration. You can ask her questions about the program, registration, course offerings, graduation, or any other program-related topic. She can be reached at metcsol@bu.edu or (617) 353-2566.

Your Computer Science Department Program Manager, Crystal Kelley. Crystal is responsible for administering most aspects of the Computer Science Department. You can reach Crystal at kelleycr@bu.edu or (617) 353-2566.

Andrew Gorlin, Academic Advisor. Reviews requests for transfer credits and waivers. Advises students on which courses to take to meet their career goals. You can reach Andrew at asgorlin@bu.edu, or (617)-353-2566.

Professor Guanglan Zhang, Computer Science Department Chairman. You can reach Professor Zhang at guanglan@bu.edu or at 617-358-2566.

Professor Lou T. Chitkushev, Associate Dean for Academic Affairs, Metropolitan College. Dr. Chitkushev is responsible for the academic programs of Metropolitan College. Contact Professor Chitkushev with any issues that you feel have not been addressed adequately. The customary issue-escalation sequence after your course facilitator and course faculty is Professor Temkin, and then Professor Chitkushev.

Professor Tanya Zlateva, Metropolitan College Dean. Dr. Zlateva is responsible for the quality of all the academic programs at Boston University Metropolitan College.

Disability and Access Services

In accordance with University policy, every effort will be made to accommodate students with respect to speech, hearing, vision, or other disabilities. Any student who may need an accommodation for a documented disability should contact Disability and Access Services at 617-353-3658 or at access@bu.edu for review and approval of accommodation requests.

Once a student receives their accommodation letter, they must send it to their instructor and/or facilitator each semester. They must also send a copy to their Faculty & Student Support Administrator, who may need to update the course settings to ensure accommodations are in place. Accommodations cannot be implemented if the student does not send their letter.

Netiquette

BU Virtual has produced a netiquette guide to help you understand the potential impact of your communication style.

Before posting to any discussion forum, sending an email, or participating in any course or public area, please consider the following:

Ask Yourself…

- How would I say this in a face-to-face classroom or if writing for a newspaper, public blog, or wiki?
- How would I feel if I were the reader?
- How might my comment impact others?
- Am I being respectful?
- Is this the appropriate area or forum to post what I have to say?

Writing

When you are writing, please follow these rules:

- **Stay polite and positive in your communications.** You can and should disagree and participate in discussions with vigor; however, when able, be constructive with your comments.
- **Proofread your comments before you post them.** Remember that your comments are permanent.
- **Pay attention to your tone.** Without the benefit of facial expressions and body language, your intended tone or the meaning of the message can be misconstrued.
- **Be thoughtful and remember that classmates' experience levels may vary.** You may want to include background information that is not obvious to all readers.
- **Stay on message.** When adding to existing messages, try to maintain the theme of the comments previously posted. If you want to change the topic, simply start another thread rather than disrupt the current conversation.
- **When appropriate, cite sources.** When referencing the work or opinions of others, make sure to use correct citations.

Reading

When you are reading your peers' communication, consider the following:

- **Respect people's privacy.** Don't assume that information shared with you is public. Your peers may not want personal information shared. Please check with them before sharing their information.
- **Be forgiving of other students' and instructors' mistakes.** There are many reasons for typos and misinterpretations. Be gracious and forgive other's mistakes or point them out privately and politely.
- **If a comment upsets or offends you, reread it and/or take some time before responding.**

Important Note

Don't hesitate to let your instructor or your faculty and student support administrator know if you feel others are inappropriately commenting in any forum.

All Boston University students are required to follow academic and behavioral conduct codes. Failure to comply with these conduct codes may result in disciplinary action.

Registration Information and Important Dates

View the drop dates for your course.

Withdraw or drop your course.

- If you are dropping down to zero credits for a semester, please contact your college or academic department.
- **Nonparticipation in your online course does not constitute a withdrawal from the class.**
- If you are unable to drop yourself on MyBU Student Portal, please contact your college or academic department.
- Online courses will open to students in Blackboard on the first day of the term.
- Online courses close to students three weeks after the last day of the term. Please plan to download and save any assignments or material you'd like to keep by that date.

Technical Support

Help Desk

Boston University IT Help Desk can be reached via email (ithelp@bu.edu), phone (617-353-4357) or by filling out the support form on their website. For IT Help Desk hours of operation, visit the contact page. If you are contacting IT outside of business hours, you will receive a response the following day. Visit the BU Information Services & Technology (IS&T) news page for announcements and system-wide alerts.

Technology Requirements and Resources

To successfully view all content in your course, it is important that your computer setup meets the necessary minimum technical requirements. Certain courses with specific functionality or educational tools may require additional technical requirements, these details can be found on the Course Resources or Materials page in the Syllabus.

System Requirements

- Access to reliable, high-speed internet: Check your internet connection speeds
- Learning Management System (Blackboard): System Requirements
- Synchronous live classroom sessions (Zoom): System requirements for Windows, macOS, and Linux
- Courses with proctored exams (Examity): System requirements for Windows, macOS
- Two-factor authentication service for BU applications: Duo Security

Downloads

- Recommended web browsers: Mozilla Firefox or Google Chrome
- Synchronous live classroom sessions (Zoom): Zoom download center
- Courses with proctored exams (Examity): Desktop or laptop computer with Google Chrome or Microsoft Edge
- Two-factor authentication service for BU applications (Duo Security): optional Duo Mobile download for iOS or Duo Mobile download for Android

Recommended Hardware

- Desktop or laptop computer recommended for best experience, some course functionality including proctored exams are not compatible with phones or tablets
- Headset with built-in microphone for high quality audio during live classroom sessions

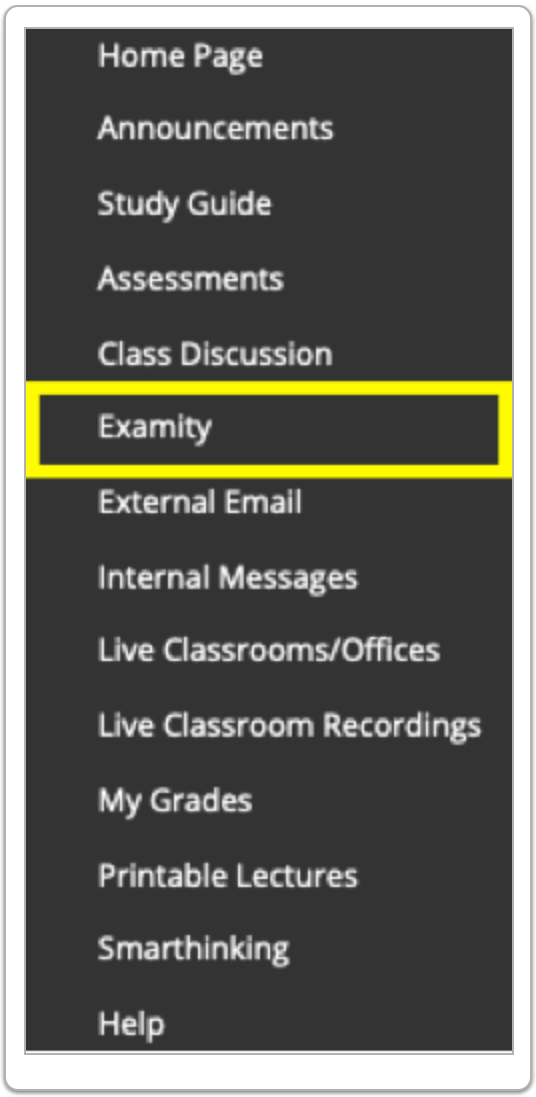
- Webcam (required for proctored exams)
- Working computer speakers (required for proctored exams)

Clearing Your Browser Cache

It is recommended that users periodically clear their browser cache to ensure they are viewing the most current course content. Completing this step often resolves login issues and problems viewing course materials.

Proctored Exams

Courses with proctored exams will have an Examity link in the left-hand course navigation. This link will not appear until scheduling opens. The BU Virtual Assessment Administrator will notify you when it is time to schedule your exam. Details on Examity's technical requirements and how to schedule your exam are in the Proctored Exam Information module on the course homepage. The Assessment Administrator can be reached at pexams@bu.edu. Examity support is available 24/7 via phone (855-392-6489), email (support@examity.com), or 'live chat' when logged in to the Examity dashboard.



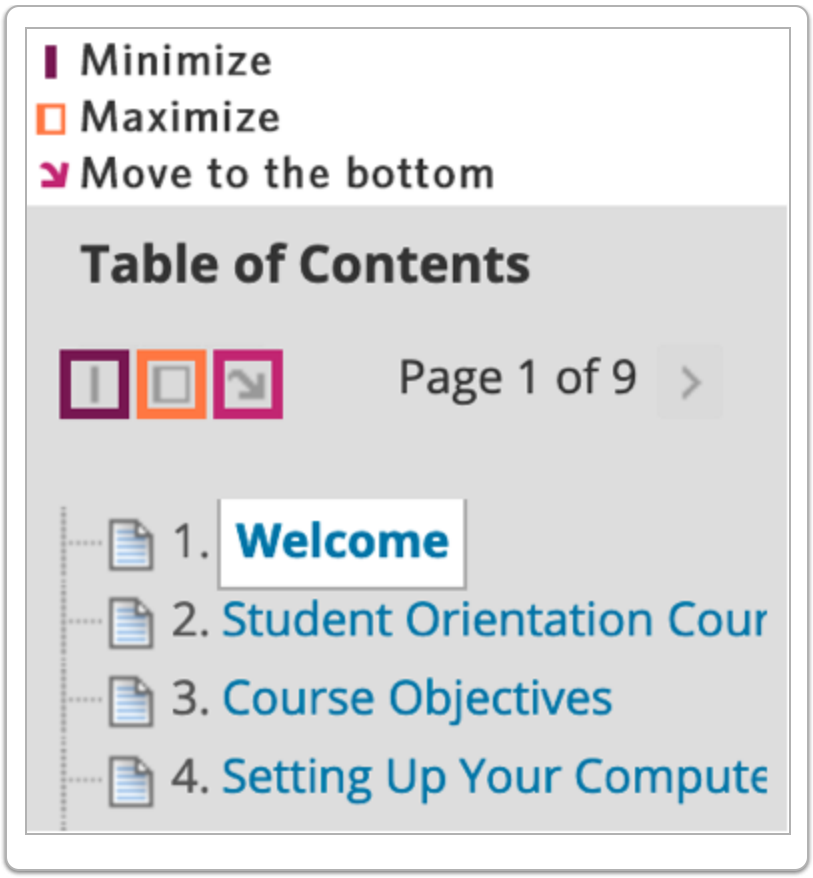
Navigating Courses

> While navigating through your courses it's important to note that all hyperlinks will open in a new browser window.

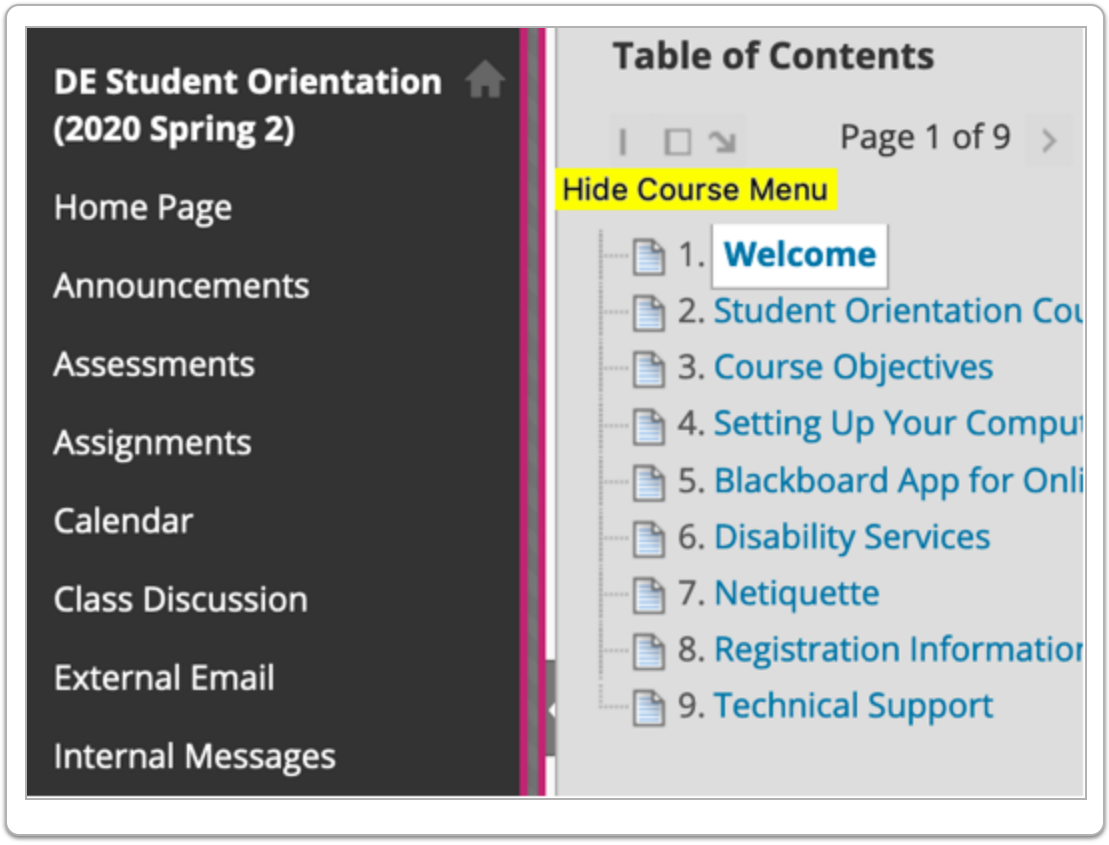
The Blackboard navigation tools—shown in the images below—allow you to show and hide both the Course Menu and the Table of Contents which can free up space when moving through weekly lecture material.

The Table of Contents may contain folders that open and close (+ and − signs) and may conceal some pages. To avoid missing content pages, you are advised to use the next- and previous-page buttons (and icons) in the top-right corner of the learning content.

Navigation tools for the Table of Contents are shown in the image below:



Clicking the space between the Course Menu and the Table of Contents allows you to show or hide the Course Menu on the left:



Boston University Metropolitan College