Boston University Metropolitan College

MET CS 689 Designing and Implementing a Data Warehouse 2026 Spring 2 Online Course Syllabus

Instructor

Jack Polnar, jpolnar@bu.edu

Course Duration

Start: March 10, 2026
End: April 27, 2026

Course Credits

4 credits

Course Description

This course provides students with the engineering skills required to evaluate, implement, and scale data warehousing, with a focus on dimensional modeling, ETL/ELT (Extract, Transform, Load) processes, and data visualizations.

Students will learn how to design and implement a data warehouse using dimensional modeling techniques, which involve organizing data into "facts" and "dimensions" to create a structure that is optimized for querying and analysis. Students will deep dive into ETL/ELT processes to extract data from various sources via Python and SQL, transform it into a consistent format, and load it into a data warehouse, including how to handle data changes from deltas by loading data into slowly changing dimensions.

In addition, the course will cover data visualization techniques to help students present data in a clear and meaningful way. Students will learn how to use tools such as Tableau or Power BI to create visualizations that can be used to explore and analyze data from a data warehouse. The course will also explore cloud based scaled out data warehousing via the Spark architecture focusing on semi-structured data.

Overall, this course will provide students with a foundational understanding of data warehousing concepts and skills that are essential for careers in data analysis, business intelligence, and other data-related fields.

Prerequisites: CS 579 or 669 and CS 520 or CS 521, or instructor consent

Course Learning Objectives

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

- Understand the purpose of data warehousing
- Apply standard SQL Analytical functions for business intelligence reporting
- Perform dimensional data modeling
- Perform Extract, Transform, and Load (ETL and ELT) for varied data using Python and SQL techniques
- Understand, implement, and load Slowly Changing Dimensions (SCD) and Fact tables of various grains accounting for data changes (deltas).
- Understand and Implement business intelligence reporting via visualizations (dashboards)
- Introduction to working with semi-structured (Big Data) datasets and analysis with cloud-based data warehousing (Spark)
- Understand and apply performance tuning focusing specifically on the ETL and ELT process.
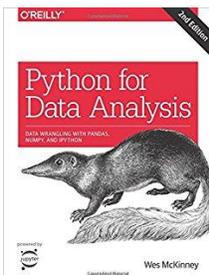
Course Materials

Recommended Book
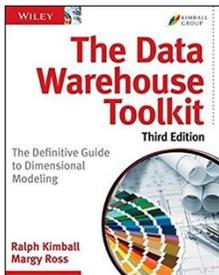
Kimball, R., & Ross, M. (2013). *The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling* (3rd ed.). Wiley & Sons. ISBN 9781118530801.
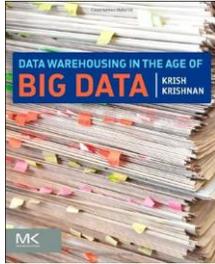
An e-book is available at the BU Bookstore. An e-book is available at the BU Library. An e-book is available at Vitalsource.com. An e-book is available through Amazon

Optional Books

McKinney, W. (2017). *Python for Data Analysis* (2nd ed.). O'Reilly Media. ISBN 9781491957660.

An e-book is available at Vitalsource.com. An e-book is available through Amazon. An e-book is available for free through the BU library.

Krishnan, K. (2013). *Data Warehousing in the Age of Big Data*. ELSEVIER. ISBN 9780124058910. An e-book is available at Vitalsource.com. An e-book is available through Amazon.

An e-book is available for free through the BU library.

Module 1 Study Guide and Deliverables
(March 10 – March 16)

Readings:

Recommended:
Kimball, R., & Ross, M. (2013). The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling (3rd ed.). Wiley and Sons.

- Chapter 1

Optional:
- McKinney, Ch 1
- Molinaro, SQL Cookbook
    - Chapter 10: Working with Ranges
    - Appendix A: Window Function Refresher
- Window Functions in SQL

Assignments:

- Assignment 1A due **Sunday, March 15,** at 6:00 AM ET
- Assignment 1B due **Wednesday, March 18,** at 6:00 AM ET

Assessments:

- Crediting Sources Tutorial Self-Assessment due **Thursday, March 19** at 6:00 AM ET

Live Classrooms:

- Supplementary Live Session, **Tuesday, March 11,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, March 12,** 8:00 PM - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, March 14,** 10:00 AM - 11:00 AM ET
- Live Office, Monday, **March 16, ,** 8:00 PM - 900 PM ET

Module 2 Study Guide and Deliverables
(March 17 – March 23)

Readings:

Recommended:
Kimball, R., & Ross, M. (2013). The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling (3rd ed.). Wiley and Sons.
- Chapters 2 and 18

Optional:
- Krishnan, Chapters 6 and 7

Assignments:

- Assignment 2, due **Wednesday, March 25** at 6:00 AM ET
- Term Project Update #1, due **Wednesday, March 25** at 6:00 AM ET

Live Classrooms:

- Supplementary Live Session, **Tuesday, March 18,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, March 19,** 8:00 PM - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, March 21,** 10:00 AM - 11:00 AM ET
- Live Office, Monday, **March 23,** 8:00 PM - 900 PM ET

Module 3 Study Guide and Deliverables
(March 24 – March 30)

Readings:

Recommended:
Kimball, R., & Ross, M. (2013). The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling (3rd ed.). Wiley and Sons.
- Chapters 19 and 20

Assignments:
- Assignment 3A due **Wednesday, April 1,** at 6:00 AM ET
- Term Project Update #2 due **Wednesday, April 1**, at 6:00 AM ET
- Assignment 3B due **Sunday, April 5,** at 6:00 AM ET

Live Classrooms:

- Supplementary Live Session, **Tuesday, March 25,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, March 26,** 8:00 - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, March 28,** 10:00 AM - 11:00 AM ET
- Live Office, Monday, **March 30,** 8:00 PM - 900 PM ET

Module 4 Study Guide and Deliverables
(March 31 – April 6)

Readings:

Optional:
- Krishna, Chapters 12 and 13

Assignments:
- Assignment 4 due **Wednesday, April 8,** at 6:00 AM ET
- Term Project Update #3 due **Wednesday, April 8,** at 6:00 AM ET

Live Classrooms:

- Supplementary Live Session, **Tuesday, April 1,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, April 2,** 8:00 PM - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, April 4,** 10:00 AM - 11:00 AM ET
- Live Office, Monday, **April 6,** 8:00 PM - 900 PM ET

Module 5 Study Guide and Deliverables
(April 7 – April 13)

Readings:

Optional:
- Krishna, Chapters 2, 3, 4, and 11

Assignments:
- Assignment 5 due **Wednesday, April 15,** at 6:00 AM ET
- Term Project Update #4 due **Wednesday, April 15,** at 6:00 AM ET

Live Classrooms:

- Supplementary Live Session, **Tuesday, April 7,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, April 8,** 8:00 PM - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, April 11,** 10:00 AM - 11:00 AM ET
- Live Office, Monday, **April 13,** 8:00 PM - 900 PM ET

Module 6 Study Guide and Deliverables
(April 14 – April 20, 2025)

Readings:

Optional:
- Krishna, Chapters 8 and 9
- [10 Tips to Improve ETL Performance](#)
- [Optimization and Tuning in Data Warehouses](#)

Assignments:

- Final Term Project due **Thursday, April 23,** at 6:00 AM ET
- Final Project Presentation during Week 6

Live Classrooms:

- Supplementary Live Session, **Tuesday, April 14,** 8:00 PM - 10:00 PM ET
- Current week's assignment review and examples, **Wednesday, April 15,** 8:00 PM - 9:00 PM ET
- Supplementary Live Session and Live Office, **Saturday, April 18,** 10:00 AM - 11:00 AM ET

Course Evaluation:

Please complete the course evaluation once you receive an email or Blackboard notification indicating the evaluation is open. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students.

Final Exam

The Final Exam is a proctored exam available from **Wednesday, April 22, 2026, at 6:00 AM ET to Saturday, April 25, 2026, at 11:59 PM ET**.

The Computer Science department requires that all final exams be administered using an online proctoring service, which you will access via your course in Blackboard. In order to take the exam, you are required to have a working computer, webcam, speakers, and microphone that meet the proctoring service's system requirements. A detailed list of those requirements can be found in the Proctored Exam Information module located on the course home page. Additional information regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your proctored exam session within the defined exam window.

Course Grading Information

The course is conducted by means of a sequence of readings from the textbooks, lectures in text and graphic form, and exercises. 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**: The Computer Sciences department requires that all final exams be administered using an online proctoring service that you will access via your course in Blackboard. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment.

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 Structure and Distribution

- Assignments 35%
- Term Project Updates: 5%
- Term Project: 30%
- Final Exam: 30%

Grade Computations

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

The Term Project Update grades are Acceptably on track (1), Not yet acceptably on track (0). Updated summatively account for 5% of grade and are not an average. Otherwise:

>=2.5 " Acceptably...": A
>=2 " Acceptably...":: B
>=1 " Acceptably...":: C
<1 " Acceptably...":: D
None "meets ...":: F

Expectations

We recognize that emergencies occur in professional and personal lives. If one occurs that prevents your completion of homework by a deadline, please make this plan to your facilitator. This must be done in advance of the deadline (unless the emergency makes this impossible, of course), and should be accompanied by particulars that back it up. Additional documentation may be requested.

Penalties for Late Work

Assignments

- 3 days late 10% grade reduction (72 hours past the original due date)
- 5 days or more late 50% grade reduction (120 hours past the original due date)

Project Updates

- **Term Project Updates:** No credit past 1 day late (24 hours past the original due date) - however, feedback will be provided.
- **Presentation**: 20% deduction for not presenting on your scheduled date and time of presentation unless arrangements have been made 3 days ahead of time.
- **Term Project completion:** 100% deduction if term project is not presented. No credit can be awarded for a project that is not presented.

Use of Artificial Intelligence (AI) Tools

Students may use AI tools (such as ChatGPT or similar systems) as support for learning and development, including assistance with understanding concepts, refining logic, or improving code and presentation. Any use of AI must be clearly disclosed in the submission, in plain language, explaining how the tool was used and how the student's own thinking, decisions, or modifications are reflected in the final work. Formal citation styles are not required.

AI use is explicitly evaluated as part of the course rubric. Strong work demonstrates that AI tools enhance the student's original reasoning, clarity, and technical understanding, while weak work relies on AI output with little evidence of independent thought or comprehension. Students are fully responsible for the accuracy and correctness of all submitted work. Undisclosed AI use, or overreliance on AI that replaces rather than supports learning, will negatively impact evaluation and may constitute an academic integrity violation.

Academic Conduct Code

Academic Integrity: Plagiarism is the passing off of another's words or ideas as your own, and it is a serious academic offense. Plagiarism and cheating also defeat the purpose of getting an education. Plagiarism and cheating cases will be handled in accordance with the disciplinary procedures described in the College of Arts and Sciences Academic Conduct Code. You are expected to know and abide by the code, which can be read online: Academic Conduct Code. Penalties range from failing an assignment or course (first offense) to suspension or expulsion from BU. If in doubt, cite your source. If you have any questions about academic integrity, please ask your instructor.

Incidents of academic misconduct will be reported to the Academic Conduct Committee (ACC). The ACC may suspend/expel students found guilty of misconduct.

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

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

accommodation is in place. Accommodation cannot be implemented if the students do not send their letters.