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(<https://buffalo.zoom.us/j/3512713503?pwd=TE90MlBaNlpnMUh1TUJQRGloWmlsQT09>) or by appointment

### Course Objectives:

This course provides students with an introduction to data warehousing and the concepts of online analytical processing (OLAP). We will cover both technical and non-technical concepts to provide a comprehensive view of modern data warehouses, the processes involved in proposing, designing, and implementing a warehouse, and technical implementation methods through the lens of industry-leading platforms.

### Course Sections:

Section	Day/Time	Location
F1S	Mo/We 9:30AM-10:50AM	Jacobs 122 (North)
F2S	Mo/We 2:00PM-3:20PM	Obrian 107 (North)
F3S	Tu/Th 3:30PM-4:50PM	Alfiero 103 (North)

### Course Materials:

#### *Required Reading materials*

- Kimball, Ralph, and Margy Ross. *The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling*, John Wiley & Sons, Incorporated, 2013

#### *Required Technology*

- The course is focused on hands-on learning and students will be required to practice some of the tools and techniques learned during lecture. **Access to a computer running Windows is strongly suggested for all students** (as access to a Windows device is required by per School of Management computing policies (<https://mgt.buffalo.edu/current-students/school-facilities/computing-requirements.html>)). If you choose to use a MacOS device, please be advised that our ability to provide technical support will be limited. If you do not have access to a capable computer, let me know as soon as possible.

#### *Hands-on Technology Stacks Used*

- Oracle Cloud will be used for hands on exposure to developing and maintaining a Data Warehouse. All students will be provisioned an account to Oracle Cloud and provided with guided walkthroughs to assist with homework assignments.
  - Why Oracle Cloud?** Oracle is a top name in the data management industry, and consistently is ranked a global leader in the space (see: Gartner Magic Quadrant for Data Management). Additionally, Oracle Cloud allows for a no-install, always-free cloud option for students, which allows us to build enterprise-grade solutions without additional cost to you, and without hardware and OS restrictions. Finally, along with database and data warehousing experience, students will gain proficiency with administering cloud environments.
  - Who uses Oracle Cloud's Data Warehousing functions?** Companies all over the world across industries, such as Experian, Lyft, Accenture, Vodafone, and CERN.
- Apache Hop will be used for hands on labs involving developing data pipelines, data engineering, and ETL processes. Students will be expected to download and run Apache Hop and will be provided with guided walkthroughs to help establish data integration pipelines with their Oracle Cloud data warehouse environments.

- **Why Apache Hop?** Apache Hop is an open source product, and is available to use free of charge and is a fork of the industry-leading Pentaho Data Integration platform. I chose Apache Hop because it provides a streamlined series of use cases and integrations for our course, and strikes a careful balance between GUI and SQL for learning the nuances of data transformation and integration. Finally, Apache Hop is Java-based, which allows it to run on both Mac and Windows devices.
- **Who uses Apache Hop?** Companies all around the world across industries, such as St. Jude's Children's Research Hospital.

### Method of Course Delivery

As of the time of this update, all sections of MGS657 will be delivered as live, in-person classes. This includes the midterm (in-class) and the final exam (scheduled through Hub). ***Do not come to class if you are feeling sick.*** I will cancel lecture (or record a lecture) if I am feeling sick.

### Homework Assignments:

There are five homework assignments designed to reinforce the material that has been covered in the lecture. Completion of these assignments is crucial to your success in the class. Homework assignments should always be submitted by ***end of day (11:59PM) on Friday in the week they are due.*** **Late assignments are not accepted and will receive a score of 0.** Any questions pertaining to your homework grades must be addressed within 2 weeks of the due date.

### Critical Responses:

Each student will be expected to complete 3 critical responses throughout the semester. Critical responses are ***research-oriented write-ups***, designed to facilitate a critical analysis of the chosen topic. Critical responses will be 3-5 pages double spaced and **must include works cited**. Be creative, and make sure to address feedback in future submissions.

Some ideas:

- A persuasive proposal for why an organization might implement something specific relating to data warehousing
- An analysis of a trends or problems in the field of data warehousing and business intelligence
- An overview of a specific warehouse/BI product or service (e.g., cloud service)
- A research write-up on a topic we have not covered in class, or a deeper dive into a topic we have covered
- There are a number of chapters in the course textbook that are not covered by required reading. This is by design—they are case study chapters that you can use for some, or all, of your critical responses. You may choose to summarize the case, create your own dimensional models, etc.
- You may also consider writing critical responses for topics covered by any course guest lectures.

In lieu of completing one or more critical responses, students may choose to complete formalized training in a data warehouse (analytical) tool, resulting in a Digital Badge or Certification. A full exam certification can be used in lieu of completing 2 critical responses, while a digital badge can be used to replace 1. This **must** be completed in the semester the course is taken (e.g., if you have previously achieved one of these, it will not count... the idea is to enhance your knowledge, after all!). Students may use this in lieu of as many of the 3 critical responses as desired. For example, completing an approved certification and digital badge could be used in lieu of all 3 critical responses. Similarly, 3 applicable digital badges can be used to replace all 3 critical responses.

Currently accepted certification exams include:

- Microsoft DP-203 (Data Engineering on Microsoft Azure)
- Google Cloud Certified Professional Data Engineer
- Snowflake Snowpro Core Certification

Currently accepted digital badges include:

- Snowflake Hands-On Essentials – Data Warehouse (Snowflake)
- Tableau Connect to and Transform Data (Tableau)
- Engineer Data in Google Cloud (Google)
- Insights from Data with BigQuery (Google)
- Build and Optimize Data Warehouses with BigQuery (Google)

Students can earn up to a maximum of ***10 points*** of extra credit once their critical response criteria has been met by completing either:

- An additional digital badge
- An additional critical response

- An additional certification

### Grading Rubric for Assignments:

Points awards to lab and critical responses are determined as follows:

#### Writing quality (~20%)

- Excellent writing skills: paragraphs have points; sentences well-constructed; argument is clear from beginning to end.
- Discussion is highly polished.
- Well-organized and easy to follow, with an introduction and conclusion.

#### Depth of response (~30%)

- Discussion is insightful, thorough, and interesting.
- Discussion demonstrates a thorough understanding of the reading/lab assignment and is substantiated by several examples from the textbook, class lecture and/or companion website research.
- Brings together multiple strands of evidence into a coherent whole.

#### Completion of ALL stated objectives (~50%)

- All sections and components of the lab write-up or reading response are addresses. This may include (but is not limited to) requested screen shots, references to self-guided research, pasting of command line outputs, etc.
- Depending on the rigor of the lab or reading response, some assignments may be worth more points (as they may take more time to complete). Overall assignment weight will be denoted in UBLearns.

Academic integrity is a core underpinning of this class. Any signs of academic dishonesty, as explained in the syllabus, could minimally result in a grade of a zero.

It is important that ALL work be cited and referenced. Research using external sources is encourage, however, all external sources **MUST** be referenced. Knowledge gleaned by research must be **RESTATED** in a student's own words.

### Style Guide for Assignments

All documents that require submission for MGS 657 should be formatted with:

- Double spacing (1.5 lines or double)
- 10-12 pt. font
- A standard font such as Arial, Courier New, Times New Roman, Roboto, or Calibri.
- Saved in an MS Word or PDF format
- Citations and footnotes when appropriate

The biggest area where students struggle is with **citations and footnotes**. While full blown bibliography or "works cited" sections are NOT necessary, students should be clear, with footnotes, where any external information comes from. Even information or examples that are cited in assigned readings should be noted.

Pictures are permitted but should be no more than 2"x2" in size and should be wrapped tight to your text. Any images should be created by you, the student using something like PowerPoint or a scanned, hand drawn image. Screenshots are always encouraged, especially for lab work. Screen shots should be generated by the student submitting the assignment and will not count towards overall page count.

Submissions should be checked for spelling correctness, grammar quality and auto-correct errors.

Students should **AVOID copying and pasting** large amounts of text from online or class provided resources. This can often be misconstrued as cheating.

Use the same standard and quality of writing which you would in a professional position. Imagine that instead of turning an assignment in for a grade, that you're turning a project in to your CEO. The outcome of the project you're submitting could determine your next salary increase!

Putting hard work into class deliverables will pay off in ways that will benefit you long after you've left the classroom!

### Exams:

There will be a midterm exam during the semester and a non-cumulative final exam administered during finals week. There are no make-up exams except under exceptional circumstances.

**Academic Integrity:**

Academic integrity is critical to the learning process. It is your responsibility as a student to complete your work in an honest fashion, upholding the expectations your individual instructors have for you in this regard. The ultimate goal is to ensure that you learn the content in your courses in accordance with UB's academic integrity principles, regardless of whether instruction is in-person or remote. Thank you for upholding your own personal integrity and ensuring UB's tradition of academic excellence. <https://www.buffalo.edu/academic-integrity.html>

Please also include any additional instructor, programmatic, departmental or decanal level requirements regarding academic dishonesty, as applicable.

**Class Attendance, Discussion, participation, and professionalism:**

Class involvement is heavily encouraged and indeed necessary to do well in this class. A portion of your class involvement will be your attendance to class. At various times in the class, the instructor will conduct interactive activities that require students to submit hard-copy deliverables through UBLearns. These deliverables will be used to grade attendance.

Additionally, there is a subjective portion to a student's overall class participation score. Students need to regularly engage in class discussion and be truly "present" in class" (ex. NOT buried in their laptops or working on other class assignments). Simply showing up to class is good, but not the entire picture when it comes to class participation.

Professionalism is a core underpinning of being a student in a graduate school of management. All students are expected to act professionally per the guidelines set forth in the handbook. In this class, examples of professionalism include:

- Attending class regularly. There is no need to notify me if you will be absent. And, naturally, please do not attend class if you are sick. I will always assist you in making up missed content.
- Arriving to class on time. Arriving late to class can be highly disruptive to your classmates. If you are late, please take care to quietly enter the classroom. If you make a habit of arriving late, this may impact your score on professionalism.
- Communicating professionally. Please make sure your communications remain courteous and professional. This is good practice for your future job roles, and is just generally a good habit to get into. While I don't mind ChatGPT usage in the class, it is not appropriate to let ChatGPT write every email for you. In fact, it is obvious to an instructor when you do this. Things like "I understand the importance of not submitting my homework late" are clearly AI generated (not to mention when people leave a variable present--- Dear [PROFESSOR NAME]). Using AI to help you craft more thoughtful emails is not the same as using it to write for you. Take the time to craft thoughtful messaging. It might seem silly, but these habits will serve you well long after you've graduated from our programs.
- Further, the practice of "grade grubbing" will not be tolerated. The instructor cannot and will not "bump" a grade to help a student GPA or provide extra credit beyond what is already discussed in class. Requests to an instructor to increase a grade or for additional extra credit, especially those which occur after the conclusion of the semester will, at best, not be responded to and, at worst, result in a reduction of the professionalism grade listed below.

Failure to observe these guidelines may result in a reduction of professionalism points.

**Assignments and Grading:**

Assignments and Exams	Points
Homework Assignments (5)	60
Midterm Exam	50
Final Exam	50
Critical Responses (3)	30
Participation/Professionalism	10
<b>Total</b>	<b>200</b>

A course grade of A is 190 points and above, A- is 180 points and above, B+ is 175 points and above, B is 170 points and above, B- is 160 points and above, C+ is 155 points and above, C is 150 points and above, C- is 140 points and above, D is 130 points and above and a grade of F is earned if you receive fewer than 130 points. Depending on the overall class performance, I reserve the right to adjust the scale. My decision to adjust the scale will only be made at the end of the semester once all of the course grades are in.

**A grade of incomplete ("I")** indicates that additional coursework is required to fulfill the requirements of a given course. I may only give an "I" grade if you have a passing average in coursework that has been completed, have extenuating circumstances as defined by the university, and have well-defined parameters to complete the course requirements that could result in a grade better than the default grade. An "I" grade will not be assigned if you do not attend the course. Prior to the end of the semester, you must initiate the request for an "I" grade and receive my approval. If an "I" grade is granted, I will specify a default letter grade at the time the "I" grade is submitted. A default grade is the letter grade you will receive if no additional coursework is completed. "I" grades must be completed within 12 months. I may set shorter time limits for removing an incomplete than the 12-month time limit. Upon assigning an "I" grade, I will provide a specification, in writing or by electronic mail, of the additional requirements to be fulfilled. Please read the full Incomplete Policy:

<http://grad.buffalo.edu/succeed/current-students/policy-library.html#i-grade>

November 13, 2024 is the last day to resign the course.

#### Tentative Course Schedule:

Week	Reading (Due on the first class of the following week)	Topics	Assignments Due
8/26	<a href="#">Comparative Study of Data Warehouses Modeling Approaches</a>	<ul style="list-style-type: none"> <li>Course Introduction</li> <li>Overview of Data Warehouse Fundamentals</li> </ul>	
9/2	Data Warehouse Toolkit Chapter 1, Chapter 17	<b>Labor Day is Monday, 9/2. I will not hold Monday or Tuesday sections of OLAP to keep sections synchronized.</b> <ul style="list-style-type: none"> <li>OLTP vs OLAP</li> <li>Dimensional Modeling</li> </ul>	
9/9	Data Warehouse Toolkit Pg. 37-41 Data Warehouse Toolkit Pg. 46-50, 56-58, 62-67	<ul style="list-style-type: none"> <li>Data warehouse initial planning</li> <li>Business process mapping</li> </ul>	
9/16	Data Warehouse Toolkit Pg. 41-45, 58-62, Chapter 18	<ul style="list-style-type: none"> <li>Data warehouse planning (cont.)</li> <li>Developing dimensional tables</li> </ul>	Homework 1 due
9/23	Data Warehouse Toolkit Chapter 3	<ul style="list-style-type: none"> <li>Developing dimensional tables (cont.)</li> <li>Developing fact tables</li> </ul>	Critical Response 1 due
9/30		<ul style="list-style-type: none"> <li>Developing fact tables (cont.)</li> <li>Architecting your warehouse for AI workloads</li> </ul>	Homework 2 due
10/7	Data Warehouse Toolkit Chapter 8	<ul style="list-style-type: none"> <li>Exam review</li> </ul> <b>Midterm Exam (Wednesday or Thursday depending on your class section)</b>	
10/14	Data Warehouse Toolkit Chapter 14	<b>**NO CLASS MONDAY/TUESDAY IN OBSERVANCE OF FALL BREAK**</b> <ul style="list-style-type: none"> <li>Data warehouse platforms, technologies, and implementation strategies</li> </ul>	
10/21	Data Warehouse Toolkit Chapter 19	<ul style="list-style-type: none"> <li>ETL</li> </ul>	Homework 3 due Critical response 2 due
10/28	Data Warehouse Toolkit Chapter 20	<ul style="list-style-type: none"> <li>ETL (cont.)</li> </ul>	
11/4	Data Warehouse Toolkit Chapter 17	<ul style="list-style-type: none"> <li>Business intelligence</li> </ul>	
11/11		<ul style="list-style-type: none"> <li>Business intelligence (cont.)</li> </ul>	Homework 4 due

11/18		<ul style="list-style-type: none"> <li>Warehouse performance considerations</li> </ul>	
11/25		<ul style="list-style-type: none"> <li>Security, privacy, and compliance</li> <li><b>**NO CLASS WEDNESDAY/THURSDAY IN OBSERVANCE OF THANKSGIVING**</b></li> </ul>	Homework 5 due <b>(SUNDAY 12/1 at 11:59PM)</b>
12/2		<ul style="list-style-type: none"> <li>Final thoughts</li> <li>Exam review</li> </ul>	Critical response 3 due
12/9	<b>Additional Exam Review (if needed) on Monday and Final Exams (Follow Instructions in Hub)</b>		

### Learning Objectives:

1. Students will demonstrate knowledge of the processes and drivers for organizations to implement data warehouses.

Objective: Demonstrate an understanding of the difference between data warehouses and other data storage mechanisms and methodologies

Assessment: HW1

Objective: Conduct business process mapping and dimensional modeling exercises.

Assessment: HW2

Objective: Analyze case studies and/or perspectives for insight on drivers across industries

Assessment: Critical Responses

2. Students will demonstrate technical competency with common software used by industry professionals.

Objective: Demonstrate an understanding on building a database using Star Schema in Oracle Cloud

Assessment: HW3

Objective: Demonstrate basic proficiency in developing in Apache Hop for ETL

Assessment: HW4

Objective: Demonstrate basic proficiency in Microsoft Power BI or Tableau

Assessment: HW5

3. Students will demonstrate an ability to communicate (written and verbally) in a professional and objective manner.

Objective: Demonstrate effective communication and an understanding of business objectives

Assessment: Critical Response Assignments, HW1, HW2, HW5

### Accessibility Resources:

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources in 60 Capen Hall, 716-645-2608 and also the instructor of this course during the first week of class. The office will provide you with information and review appropriate arrangements for reasonable accommodations, which can be found on the web at: <http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>.

### Public Health Compliance in Classroom setting:

Please familiarize yourself with the updated health behavior expectation as indicated in the Student Compliance Policy for COVID-19 Public Health Behavior Expectations (<https://www.buffalo.edu/studentlife/who-we-are/departments/conduct/coronavirus-student-compliance-policy.html>). In addition, please review the updated fall health and safety guidelines.

### Diversity and Inclusiveness:

Openness and tolerance for diverse perspectives—taking the initiative to try to understand points of view that are different from our own—is a critical baseline expectation for all students.

Not respecting individual differences (for example culture, gender, sexual orientation, race, religion, disability status, or age) is perceived as intolerant and will not be tolerated in the classroom. Not respecting others in general is a negative attribute and detrimental to the class. Examples of violations: not respecting or facilitating the input of individuals from different cultural backgrounds, making racist, sexist or otherwise insulting or derogatory comments about a class member; bullying a classmate or engaging in any actions that create a hostile learning environment.

Please visit <http://www.buffalo.edu/inclusion/resources/IXResources.html>, which details resources, services, events and support related to equity and inclusion for students.

#### **Course Materials Disclaimer:**

All materials prepared and/or assigned by me for this course are for the students' educational benefit. Other than for permitted collaborative work, students may not photograph, record, reproduce, transmit, distribute, upload, sell or exchange course materials, without my prior written permission. "Course materials" include, but are not limited to, all instructor-prepared and assigned materials, such as lectures; lecture notes; discussion prompts; study aids; tests and assignments; and presentation materials such as PowerPoint slides, or transparencies; and course packets or handouts. Public distribution of such materials may also constitute copyright infringement in violation of federal or state law. Students who violate this policy will be required to complete an educational sanction about the value of intellectual property. More serious and/or repeat violations of this policy may be treated as acts of "academic dishonesty" and/or subject a student to disciplinary charges under the Student Code of Conduct.

#### **Classroom Decorum:**

Students are reminded that being professional and kind in the classroom is a baseline expectation. Please ensure you have reviewed the classroom behavior/disruption policies: <https://www.buffalo.edu/studentlife/life-on-campus/community/rules.html>

Further, students are often unaware of university support services. For example, the Center for Excellence in Writing provides support for written work, and several tutoring centers on campus provide academic success support and resources <https://www.buffalo.edu/writing.html>

#### **Sexual Violence:**

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If you have experienced gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if you so choose. Please contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, you may also contact a Crisis Services Campus Advocate at 716-796-4399.

#### **Mental Health:**

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other issues you may experience. You can learn more about these programs and services by contacting:

##### *Counseling Services:*

120 Richmond Quad (North Campus), 716-645-2720

202 Michael Hall (South Campus), 716-829-5800

##### *Health Services:*

Michael Hall (<https://www.buffalo.edu/studentlife/who-we-are/departments/health.html>) 716-829-3316

##### *Health Promotion:*

114 Student Union (North Campus), 716-645-2837