

Instructor: Dominic Sellitto, CISSP

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Office hours: Monday/Wednesday 1PM-150PM or by appointment

Course Objectives:

Recent years have seen an rapid expansion in new technology adoption across industries, primarily focused on advancements in machine learning and the introduction of generative artificial intelligence platforms. Current and future leaders need to understand how to build, use, and apply these new technologies effectively in order to succeed and advance their respective organizations. This course aims to provide students with a foundational understanding of current AI tools and concepts, focusing first on the basics of explainable AI. Foundational knowledge will then be utilized in support engaging students with various applied exercises with developing, implementing, and utilizing generative AI tools. Various topics, such as prompt engineering, large language models, image and sound generation models, and innovative use cases will be explored. Additionally, the course will blend these applied methods with considerations for ethical usage, legal requirements, cybersecurity concerns, and managerial pitfalls throughout.

Course Sections:

| Section | Day/Time | Location |
|---------|-----------------|-------------|
| S1S | M/W 2PM-3:20PM | Obrian 209 |
| S2S | Tu/Th 5PM-620PM | Alfiero 104 |

Course Materials:

Required Reading materials

- Free resources available online will be communicated throughout the class and schedule. All readings are available under the corresponding week on UBLearns.

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 lectures. **As a result, access to a working laptop is required for all students. This can be MacOS, Windows, or Linux. However, please be advised that the course technical support is structured around Windows per UB School of Management computer guidelines. That doesn't mean we won't try to help, but rather than our ability to troubleshoot may be limited on non-Windows devices.**
- As a lot of the course will require you to use your local machine to run AI workloads, a computer with 8GB RAM and a mid-range CPU is recommended (e.g., Ryzen 5 or Intel i5, M1 or newer) and at least 40GB of free storage space. Computers with more compute power (e.g., dedicated GPU, 16GB ram, faster processors) will have an easier and faster time running AI workloads.
 - If you have computer specs below this, and are unable to utilize a more powerful machine, please let me know ASAP so we can discuss. Chromebooks and iPads are not acceptable for this class.

Method of Course Delivery

As of the time of this update, all sections of MGS636 will be delivered as live, in-person classes. ***Do not come to class if you are feeling sick.*** I will cancel the lecture (or record one) 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 (11:59 PM)*** on the ***second class day in the week they are due (e.g., Thursday)***. **Late assignments are not accepted and will receive a score of 0.** Questions about grades must be addressed within 2 weeks of the due date.

Below is the list of assignments:

| Assignment | Points | Type |
|---|-----------|------------|
| HW1: Introduction to Local AI | 10 | Individual |
| HW2: Using Python and Ollama to build your first local LLM interface | 10 | Individual |
| HW3: Building an AI-driven advertising campaign using LLMs, image generators, music generators, and text-to-speech. | 10 | Individual |
| HW4: Building a local RAG architecture for knowledge augmentation | 10 | Individual |
| HW5: Building your AI-powered web app | 10 | Individual |
| Total | 50 | |

Critical Responses

Each student will be expected to complete one critical response throughout the semester. Critical responses can be developed based on topics covered during lecture/homework assignments, content discussed by guest speakers, or by your own research into generative AI. Critical responses are to reflect your own insight or analysis of the chosen content. These are 3-5 pages double-spaced assignments. The topic must be related to generative AI.

As an option, students are allowed to complete a relevant digital badge from an organization related specifically to generative AI in place of a paper. The instructor has discretion over allowable digital badges and must approve a badge in order for it to be considered.

Grading Rubric for Assignments:

Points awarded to assignments are determined as follows:

Writing quality

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

Depth of response

- The discussion is insightful, thorough, and interesting.
- The 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 concepts into a coherent whole.

Completion of ALL stated objectives

- All sections and components of the lab write-up or reading response are addressed. This may include (but is not limited to) requested screenshots, references to self-guided research, pasting of outputs, etc.
- Depending on the rigor of the lab or reading response, some assignment objectives may be worth more points (as they may take more time to complete).

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 zero.

ALL work must be cited and referenced. Research using external sources is encouraged, 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 636 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 or lecture notes should be noted.

Screenshots are always encouraged, especially for lab work. Screenshots should be generated by the student submitting the assignment and will not count towards the 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 that you would in a professional position. Imagine that instead of turning an assignment in for a grade, you’re turning in a project 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 no formal examinations in this class.

Final Team Project:

You will work in teams to research, write, and present a paper with an accompanying applied project (e.g., AI app) on Generative AI. More details will be provided prior to spring break.

Course Conduct:

You are required to observe the rules of academic integrity and classroom conduct established by the University at Buffalo. **Cheating will not be tolerated.** Students found cheating will receive a grade of F for the course and may be subject to further disciplinary action by the School of Management and/or the University at Buffalo.

Academic integrity is a fundamental university value. Through the honest completion of academic work, students sustain the integrity of the university and themselves while facilitating the university's imperative for the transmission of knowledge and culture based upon the generation of new and innovative ideas. For more information, please refer to the [Graduate Academic Integrity policy](#).

Furthermore, all course materials are considered copyrighted by their respective owners (either the instructor or the University) and may not be shared or distributed without prior express consent.

Class Attendance, Discussion, and Participation:

Class involvement is heavily encouraged and indeed necessary to score well in this class. A portion of your class involvement will be your class attendance. This will include regular attendance as well as participation in various in-class exercises we will conduct throughout the semester. Attendance will not be taken every class, and will be sampled throughout the semester. Missing one class where attendance is taken will not impact your grade. However, missing multiple may result in deduction of points. **Keep in mind:** Still don’t come to class if you are sick. Just stay home and focus on your health. You will not lose points for missing an attendance grade for an allowable absence that is communicated (email is fine).

Finally, 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 great, but not the entire picture when it comes to class participation.

Grading Scale:

| Assignments and Exams | Points |
|---|------------|
| Homework Assignments (5) | 50 |
| Final Team Project | 25 |
| Critical Response | 10 |
| Participation, Attendance, and In-Class Exercise Submission | 15 |
| Total | 100 |

A course grade of A is 94 points and above, A- is 90 points and above, B+ is 87 points and above, B is 83 points and above, B- is 80 points and above, C+ is 77 points and above, C is 73 points and above, C- is 70 points and above, D is 65 points and above and a grade of F is earned if you earn fewer than 65 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 assign 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. Before 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>

Tentative Course Schedule:

| Class Week | Reading (Due the following class) | Topics | Assignments (due at 11:59 PM) |
|------------|--|--|--|
| 1/22 | https://www.ibm.com/topics/artificial-intelligence | <ul style="list-style-type: none"> Course introduction Introduction to AI | |
| 1/27 | https://aws.amazon.com/ai/generative-ai/use-cases/ (Choose three to read based on your career goals) https://cloud.google.com/ai/generative-ai/stories?hl=en (Choose three to read based on your career goals) https://www2.deloitte.com/us/en/pages/consulting/articles/gen-ai-use-cases.html (Choose 3 to read based on your career goals) | <ul style="list-style-type: none"> AI Overview Generative AI Use Cases | |
| 2/3 | https://www.nvidia.com/en-us/glossary/large-language-models/ https://medium.com/data-science-at-microsoft/how-large-language-models-work-91c362f5b78f | <ul style="list-style-type: none"> Generative AI Use Cases (contd.) Introduction to language models | ** In class during this week I will ask questions about the case studies you selected last class. This may be considered an in-class exercise HW1 Due Friday at 11:59PM |
| 2/10 | https://towardsai.net/p/cloud-computing/the-difference-between-open-source-models-and-commercial-ai-ml-apis | <ul style="list-style-type: none"> Large Language Model Basics Open source and commercial large language model tools | |
| 2/17 | https://developers.google.com/machine-learning/resources/prompt-eng | <ul style="list-style-type: none"> Prompt engineering overview and methods | |

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| 2/24 | https://medium.com/@branden.m.cintyre/chevy-chatbot-misfire-a-case-study-in-llm-guardrails-and-best-practices-7ae319088e94 https://apnews.com/article/mcdonalds-ai-drive-thru-ibm-bebc898363f2d550e1a0cd3c682fa234 https://aimresearch.co/market-industry/how-unilever-is-leveraging-ai-to-drive-innovation-and-sustainability | <ul style="list-style-type: none"> Working with large language models: chatbots for managerial decision support Working with large language models: instruction-tuned models for function calling and technology accessibility | HW2 Due Friday at 11:59PM |
| 3/3 | https://techcrunch.com/2022/12/22/a-brief-history-of-diffusion-the-tech-at-the-heart-of-modern-image-generating-ai/?guccounter=1 https://www.splunk.com/en_us/blog/learn/open-vs-closed-source-software.html | <ul style="list-style-type: none"> Introduction to image generation models Open source and commercial implementations and use cases for image models | |
| 3/10 | https://docs.midjourney.com/docs/prompts https://www.ionio.ai/blog/generating-marketing-assets-using-stable-diffusion-and-generative-ai | <ul style="list-style-type: none"> Working with image generators—building consistent branded marketing | |
| 3/17 | | SPRING BREAK NO CLASS | HW3 Due Friday at 11:59PM (Suggestion: Finish this assignment early so you can enjoy spring break). |
| 3/24 | https://research.ibm.com/blog/retrieval-augmented-generation-RAG | <ul style="list-style-type: none"> Knowledge augmentation in language models: Retrieval Augmented Generation | |
| 3/31 | https://www.ibm.com/think/topics/parameter-efficient-fine-tuning#:~:text=Parameter%20efficient%20fine%20tuning%20(PEFT)%20is%20a%20method,specific%20tasks%20or%20data%20sets. | <ul style="list-style-type: none"> Fine tuning generative AI tools: Parameter efficient fine tuning (PEFT) methods, instruction fine-tuning, dataset preparation | |
| 4/7 | | <ul style="list-style-type: none"> Developing AI-powered web applications using open source products | HW4 Due Friday at 11:59PM |
| 4/14 | https://sybl.ai/developers/blog/a-guide-to-quantization-in-llms/ https://www.ey.com/en_ie/ai/should-organisations-buy-ai-systems-or-build-them | <ul style="list-style-type: none"> Technical efficiencies (model quantization) and costs. Build vs. buy | |
| 4/21 | Browse through: https://incidentdatabase.ai/ | <ul style="list-style-type: none"> Privacy, security, ethical, and legal considerations for generative AI | HW5 Due Friday at 11:59PM |
| 4/28 | | <ul style="list-style-type: none"> Team presentations Final thoughts | Critical Response Due Friday at 11:59PM |

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|-----|--|---|---|
| 5/5 | | <ul style="list-style-type: none"> NO CLASS (Group presentation overflow day only if needed) | Team project deliverables due Tuesday, 5/6 at 11:59PM |
|-----|--|---|---|

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>.

Learning Objectives:

| Outcome | Method of Assessment |
|--|---|
| Understand the core foundations of generative artificial intelligence technologies and recent advancements | HW1 |
| Explore various use cases of artificial intelligence as they relate to businesses across domains and industries. | HW2, HW3, HW4, HW5 |
| Learn how to apply generative AI knowledge through the ideation, creation, implementation, and usage of innovative tools for businesses. | HW3, HW4, HW5, Team project |
| Explore the downsides and limitations of these tools to understand the value proposition and return on investment for organizations engaging with AI technology. | HW2, HW3, HW4, HW5, and critical response |
| Demonstrate the ability to develop an innovative idea in AI and present it in a professional and objective manner. | Team Project and Presentation |