MATH 441 Discrete Optimization Problems

Learning Portfolio Outline 2022W1

A learning portfolio is a collection of artifacts that demonstrates your skills and your ability to learn. Much like a photographer's portfolio demonstrates the quality and style of their work, a learning portfolio tells the story of your learning and demonstrates the quality and style of your mathematical work. Each student will work independently to create their own learning portfolio, communicate frequently with instructors to get feedback and submit their portfolio at the end of the semester. Be creative and take ownership of your learning!

Artifacts

An artifact in your learning portfolio is *any* work that demonstrates *your learning*. There are many different kinds of learning artifacts. For example:

- Answer to a question posed during lecture (or elsewhere)
- Review of a learning resource such as a video, note, paper, podcast, blogpost, etc.
- Formulation of an original optimization problem (with a solution if possible)
- Computation implemented with Python/MATLAB/Julia
- Explanation of a proof of an important theorem
- Conceptual explanation of an algorithm
- Solution to an interesting exercise found in another textbook (or elsewhere)
- Data visualization
- Concept map
- Interview with someone who works or does research in mathematical optimization
- . . . *anything that demonstrates your learning* . . .

The following steps outline a strategy for creating artifacts for your portfolio:

- **Read** the suggested readings before lectures each week
- **Identify** what you don't know and formulate new questions
- **Engage** in discussions during lectures, ask questions and generate new questions
- **Search** online resources to find answers and generate new questions
- **Discuss** with peers and write down your own thoughts and solutions
- **Document** your progress by writing down your ideas, questions, answers, resources, etc.
- **Focus** on a specific question, concept, example, etc.
- **Create** an artifact that demonstrates your understanding of your focus
- **Get feedback** by submitting work to *Learning Portfolio Feedback* assignments on Canvas

The strategy above may create a whole mess of ideas and so the last three steps are very important: *focus*, *create* and *get feedback*.

Formats

How you present your artifacts is entirely up to you and your learning portfolio may include a combination of several different formats. For example, your learning portfolio could include:

- LaTeX document
- Jupyter notebook
- GitHub repository
- Webpage
- Video
- Podcast
- Zine
- Flashcards
- . . . *Be creative!* . . .

Feedback

There are several *Learning Portfolio Feedback* assignments on Canvas throughout the semester. Submit your work regularly to receive feedback. We will also have portfolio feedback sessions in class for students to share their work with each other. You should know what your final grade will be for the learning portfolio before you submit the final version based on all the feedback you have received during the term!

Cover Letter

Your learning portfolio should include a cover letter which introduces the reader to your work. Write the cover letter at the end of the course after you have created your artifacts. The cover letter describes your work but more importantly it is a reflection on your learning. To get started writing your cover letter, reflect on the following questions:

- What is the most important thing that you learned in this course?
- What was your process for creating artifacts?
- Which artifact are you most proud of?
- What did you find most challenging about creating your portfolio? What was most enjoyable?
- What guidance would you give to students who are getting started with their own portfolio?

Guidelines

The content and format of your portfolio is entirely up to you but the final version of your portfolio should satisfy the following guidelines:

- At least 10 artifacts in total
- At least 2 artifacts for each part of the course: linear optimization, combinatorial optimization and compressed sensing
- Each artifact should be at least 1 page of written work (or equivalent if in another format)
- Each artifact should focus on a specific question or concept
- No more than 3 artifacts of a given type (solution, proof, computation, visualization, etc.)
- No more than 2 artifacts directly related to your group project
- Each artifact must be directly related to our discussions in class

- Each artifact must demonstrate *your learning* and should *not* be a copy of an existing resource
- Portfolio must include a cover letter (equivalent to 1 written page)
- Any references must be properly (see UBC Library's How to Cite Guide)

Grading Rubric

Each artifact (and cover letter) will be graded according to 3 criteria: *Presentation*, *Clarity* and *Creativity & Understanding*. Each criteria is evaluated on a scale from 1 to 5:

5	*Excellent*	Each item in the criteria is clearly satisfied.
4	*Very Good*	Almost all items in the criteria are satisfied. Some minor improvements required.
3	*Satisfactory*	Most items in the criteria are satisfied. Several minor improvements required.
2	*Developing*	Most items in the criteria are not satisfied. Some major improvements required.
1	*Needs Revision*	Almost all items in the criteria are not satisfied. Several major improvements required.

Presentation (5 marks)

- Precise mathematical notation
- Computer code formatted according to style guide[1]
- Correct spelling and grammar throughout
- Headings, links and text properly formatted
- Figures presented clearly with title, captions, labels, legend, etc.
- All references properly cited (see UBC Library's How to Cite Guide)

Clarity (5 marks)

- Excellent writing with clear explanations
- Includes appropriate level of detail for audience (MATH 441 students)
- Precise mathematical statements throughout
- Well-organized and easy to follow

Creativity & Understanding (5 marks)

- Demonstrates mathematical maturity far beyond basic definitions
- Well-constructed mathematical arguments throughout
- Makes nontrivial connections between disparate concepts
- Restates familiar mathematical concepts in a novel way
- Presents complex mathematical information in a simple way

[1] See Python style guides PEP 8 and PEP 20, MATLAB Programming Style Guide Wiki and Julia Style Guide