DS-GA 1014: Optimization and computational linear algebra for data science
Fall 2020

- **Instructor:** Léo Miolane

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  - Office: Center for Data Science (60 Fifth Avenue) Office 607
  - Office hours: Mondays 3-4pm or by appointment.

- **Course information**

  - Lecture time and location: Thursdays 3:30pm-5:10pm in 19 West 4th Street, Room 101.
  - Course website: https://leomiolane.github.io/linalg-for-ds.html

- **Course outline**

  - This course covers the basics of optimization and computational linear algebra used in Data Science. About 66% of the lectures will be about linear algebra and 33% about convex optimization. The first 5 lectures will cover basic linear algebra. Then we will study applications: Markov chains and PageRank, PCA and dimensionality reduction, spectral clustering, linear regression. Lastly, we will go over convex functions, optimality conditions and gradient descent.

- **Grade breakdown**

  - Quizzes 5%, on Gradescope, due weekly on Thursdays at 2pm.
  - Written homework to be (scanned and) submitted as a single PDF file on Gradescope 40%. Homeworks are available on the course's website after the corresponding lecture and usually due on Sundays at 11:00 pm of the next week: this let you ~ 10 days to complete it.
  - Midterm examination: 20%.
  - Final examination: 35%.
  - All exams are open books/notes.
  - No extra credit projects will be offered.

- **Homework, quiz and examination policy**

  - The lowest quiz score and lowest written homework scores will be dropped.
  - Missed quizzes will not be made up.
  - Late homework will not be accepted. This includes homework which the file metadata indicates was created before the deadline but which was not submitted on time.
  - Other homework extensions may be granted in cases when the lecturer has good reason to believe that a student may have difficulty completing homework on time even with proper time planning (e.g. joined the course late or prolonged illness). Please e-mail the lecturer well in advance and explain your reason(s) if you would like to request other homework extensions, and note that other homework extensions are not automatically granted.

- You are permitted to discuss homework with fellow students, but homework must be written in your own words. Please list on your submission the students you work with for the homework (this will not affect your grade).

- Homeworks contain extra-credit problems (indicated with a $\star$).They will not (directly) contribute to your score of this homework. However, for every 4 extra credit questions successfully answered your lowest homework score get replaced by a perfect score.

- The Midterm and final exam will be take-home exams in limited time. This means that once you have access to the exam questions, you will have a limited time to upload your work.

- **Computing the course's grade**

  - The grades of the different evaluations will be converted to a $0 - 100$ scale and averaged:

    $$\text{Course grade} = 5\%\,(\text{Quiz}) + 40\%\,(\text{Homework}) + 20\%\,(\text{Midterm}) + 35\%\,(\text{Final})$$

  - Your letter grade for the course (the one that will appear on Albert and your transcripts) is then obtained according to:

Grade	Interval
A	≥ 93
A-	$90 \leq \cdot < 93$
B+	$87 \leq \cdot < 90$
B	$83 \leq \cdot < 87$
B-	$80 \leq \cdot < 83$
C+	$77 \leq \cdot < 80$
C	$73 \leq \cdot < 77$
C-	$70 \leq \cdot < 73$
D+	$67 \leq \cdot < 70$
D	$63 \leq \cdot < 67$
D-	$60 \leq \cdot < 63$
F	< 60

  - The grades of the quizzes/homeworks will not be curved. Only the grades of the midterm and final are going to be curved.

  - The curve will works as follows. If the mean M of the grades of the exam (midterm or final) is below 80 out of 100, then every student will receive extra $80 - M$ points to its grade. In case the new grade exceeds 100, it will be changed back to 100.

- **Academic integrity**

  - You are expected to follow codes of academic integrity as specified by the university and the College of Arts and Sciences:

    https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/academic-integrity-for-students-at-nyu.html
    https://cas.nyu.edu/content/nyu-as/cas/academic-integrity.html
    http://cas.nyu.edu/content/nyu-as/cas/academic-integrity/honor-code.html