

This document provides some more information on the MATH 303 final examination and will help you to prepare for it. ***Please read all of it carefully. We also recommend to also carefully read the next announcements posted prior to the exam.***

**Time and Access:** The Final Exam will take place on **April 29, 8:30AM (PDT)**. As exam times are set by the Department of Mathematics and FSC to coordinate with all the other exams, there will not be any alternative session. If you have exam hardship (3 exams that start and finish within 24 hours), you can contact the Undergraduate Coordinator Charlotte Dean [ugrad-coord@math.ubc.ca](mailto:ugrad-coord@math.ubc.ca)

The general organization of the exam (access to files, zoom sessions, timeline) will mostly be the same as for the previous midterms, so we recommend to read previous past announcements posted if you need more details.

The exam timeline will be as follows:

**8:25:** Zoom sessions open

**8:28:** Notebook and exam pdf file are available in the same page of the Assignment section, called *Final Exam Files*.

**8:30:** Writing starts (*1h20 of writing time*)

**9:50:** Writing ends. Prepare the submission.

**9:50-10:05:** Submit notebook and handwritten solutions for each problem to the corresponding pages. If you are done before 10:05, you can move to the next step. Resubmitted files that show changes or added solutions will not be considered without any explanation provided in comment.

**10:05-10:15:** Submit the ID file and check that all the previous files submitted are correct.

**10:15-10:20:** Check your Canvas inbox messages. If you receive a message to join a zoom call use the link provided in the message.

### **Content and testable learning outcomes:**

The format of the exam will be similar to the previous midterms. There will be four problems, including one using Jupyter notebook. Running Jupyter notebook with your student ID will also be needed to solve handwritten problems. The content will focus on the three chapters seen during class. Each handwritten problem will focus on one chapter, so you should not neglect any part of the course and be comfortable with the methods, examples and exercises presented during the lectures. The notebook problem will contain several questions that can cover all chapters. We also advise to not neglect this part. Homework Problems, notebooks and midterms given over the semester are relevant (review and reflect on your work and the solution posted).

Aside from the testable learning outcomes written for Midterm 1 and 2 (see past Announcements), you should mainly be able to:

- define and use basic properties of a continuous time Markov chain
- derive transition probabilities and times of a continuous time Markov chain
- derive and apply the Kolmogorov equations
- study, compute and apply stationary distributions

## Technical issues:

A minority of students experienced server proxy errors when downloading the notebook at the end of last midterm, although instructions and recommendations were posted before the exam to either prevent or solve this issue. ***In any case, we recommend to make a copy of the original notebook before editing it, save your notebook each time you enter a new answer, and take a screenshot of the answers and download the notebook before moving to the handwritten problems.***

Here is a list of most technical issues that can be encountered. We will simply refer to this document during the exam if asked in the chat:

- ***Unable to get access to files:*** Make sure you are looking at the right page in the Assignments section. *The notebook and exam files will be posted on the same page, called Final Exam Files, 2 minutes before writing starts. If you do not see the page being accessible, reload the page, or log out and back to Canvas (the files will be uploaded well before the exam on Canvas, so we do not expect any delay when the page becomes accessible). We will not grant extra time if you cannot get access to files on time.*
- ***Parts of the notebook cannot be edited:*** We only leave blocks needed for evaluation (e.g. entering student ID, entering answers).
- ***Unable to run the notebook with student ID:*** You can give your student ID to the TA/instructor of your zoom session using the chat, to get outputs for Problems 2, 3 and 4. We will not grant extra time if you are not able to run the notebook with your student ID.
- ***Login error when accessing syzygy:*** This happened during the midterm if one edited a file without changing its name previously, creating sync errors with Github. The notebook will be posted on a new Github repository so we do not expect this to happen during the exam. If you are not able to log to syzygy, you can alternately download the notebook to run it on your local machine (we recommend to install Jupyter on your local machine to avoid any issue with remote servers). We will not grant extra time if you are not able to get access or run the notebook on time.
- ***Server proxy errors:*** If this happens, you need to log out and log back to the server. If your answers have disappeared, you can use your screenshot to fill it again (answers are short). In any case, add your screenshot in comments of the submission before the deadline to not get the notebook marked as late (see also next point)
- ***Unable to submit file in comment box*** (only ipynb accepted): To add extra files such as screenshots, add them in the comment box of the submission page, with an explanation in comment (submitting a file directly will not work). If you cannot use the comment box, you can send your screenshot using canvas inbox message. Do not send files to the instructors or TA's email addresses.

## Penalties:

The adjudication process for graduating students is set so we will have to grade and post course grades by May 3. Given this deadline, we will not have the time to contact students or check irregular submissions as thoroughly as for the midterms. ***If we observe irregular submissions, we will automatically apply the penalties described below.*** It is your responsibility to make sure that your submission is complete, and that you follow the rules implemented to guarantee a fair evaluation.

- ***ID file not readable or not submitted:*** We will not contact students if we do not find a proper ID file. It is your responsibility to check that the file you posted is in correct format and satisfy the guidelines. The grade will not be released and the final exam will count as zero if we do not have a regular ID file. Unjustified late ID file submission will automatically lead to a penalty of at least 10 points applied to the final exam grade.
- ***Not joining the post exam checking call:*** *This will lead to an automatic penalty of at least 20 points applied to the final exam grade, and a final exam counted as zero if we do not hear back at all from the student before posting all the grades.*
- ***Late submission:*** Unjustified late submission (file received at 10:06 or after) will lead to at least 5 points removed from the final exam grade, with potentially more points deducted depending on submission time. To avoid penalties for late submission, *stop writing when instructed and do not submit files last minute. If you have issues with the notebook, make sure that you post the screenshot of your answers before the deadline. Server proxy errors won't be considered as an excuse for late submission.*