

## UBC MATH 421/510, 2021W Term 2: Real Analysis II/Functional Analysis

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**Acknowledgement:** UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the Musqueam people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

**Instructor:** Stephen Gustafson, MATH 115, [gustaf@math.ubc.ca](mailto:gustaf@math.ubc.ca)

**Office hours:** TBA

**Website:** the course Canvas page

**Time:** Mon/Wed/Fri 11:00-11:50

**Location:** this course will be online for a portion of the term. We will start in-person meetings on a date yet to be determined by UBC. At the very earliest, this will be Jan 24th. This date may be updated as time goes on. When we resume in-person activities, we will meet in our scheduled classroom space on campus

– Math Building, Room 202.

For meetings prior to that time, we will meet

– on Zoom (link from course Canvas page)

**References:** the main textbook for this course is

- G.B. Folland, *Real Analysis: Modern Techniques and Their Applications*.

A list of additional useful texts will be maintained on the course canvas page, and course slides/notes will be posted.

**Tentative Outline** (with references to corresponding sections of *Folland*):

- Banach spaces: definitions, dual spaces, properties (5.1-5.3)
- an important family of examples:  $L^p$  spaces (6.1-6.2)
- an important special case: Hilbert spaces (5.5)
- a very brief dip into point set topology (4.1-4.2)
- weak, weak-\*, and operator topologies (5.4)
- possible further topics (depending on time):
  - Riesz-Markov representation theorem (7.1-7.3)
  - introduction to Fourier analysis (parts from Ch. 8)
  - introduction to the theory of distributions (parts from Ch. 9)
  - introduction to the spectral theory of operators (different text(s))

**Evaluation:** grades will be based on

- written homework assignments (best 4 of 6): 30 %
- short quizzes (written during class time, best 4 of 6): 20 %
- final exam (scheduled in the exam period): 50 %

and may be scaled.

### **Class Policies:**

**Stay home if you are sick!** The grading scheme (dropping 2 assignments and 2 quizzes) is specifically designed not to penalize missing some time/classes due to illness.

Late assignments will not be accepted and missed quizzes will not be made up.

Students are encouraged to study together, but blatant copying of another student's work is a serious breach of academic integrity. The final write-up of your homework assignment should be your own. Similarly, quizzes must be written individually, without any form of collaboration.

**UBC Policies:** UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the UBC Senate website.

*last updated Jan. 9, 2022*