

# Math 525b - Real analysis

3 units, Spring 2019, MWF 9:00-9:50 am in KAP 148

## Contact information

- **Instructor:** Christian Zillinger
  - **Office hours:** W 1-3, F 12-1
  - **Office:** KAP 416B
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- **Grader:** tba
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## Course description

In this course we will learn about concepts in functional analysis and topology and their applications to the study of operators. Key topics include:

- Metric spaces, Banach spaces, Hilbert spaces and contraction principles
- Linear functionals on vector spaces (Riesz representation, dual spaces, Radon measures)
- The Baire Category Theorem and related results (closed graph, uniform boundedness)
- Lebesgue and Sobolev spaces, their dual spaces, distributional and weak derivatives and related estimates and inequalities
- An introduction to Fourier and harmonic analysis

## Textbook

Folland, *Real Analysis*, second edition  
Supplemental material:

- Yoshida, *Functional Analysis*

- Rudin, Functional Analysis
- Evans, Gariepy, Measure Theory and Fine Properties of Functions
- Stein, Shikarchi, Real Analysis: Measure Theory, Integration & Hilbert spaces

## Blackboard

Materials such as **homework assignments** or **results** will be posted on blackboard, <http://blackboard.usc.edu> . You should **check blackboard regularly**.

## Description and Assessment of Assignments

**Homework** sets will be made available and are due about every 7 to 10 days.

Discussion and collaboration is strongly encouraged and you are allowed to hand in homework in groups of up to two students. In the latter case, both group members should be able to explain all parts of their submitted solutions.

There will be one **midterm** in class on **February 27** (tentative) and one **final exam** towards the end of the semester.

## Grading breakdown

Assignment	% of Grade
Homework	30%
Midterm	30%
Final Exam	40%
<b>Total</b>	<b>100%</b>

## Assignment Submission Policy

Problem sets will be made available on blackboard and are due at the beginning of the lecture on Friday of the following week. Late submissions will not be accepted.

If you cannot hand in the homework in class, you may send it via email or put it in my mailbox (before the beginning of the lecture!).

## Additional Policies

There will be no make-ups for homeworks and late submissions will not be accepted and count as zero points. However, your two lowest homework scores will be automatically dropped.

In case of scheduling conflicts for the exams or emergencies, you should contact me as early as possible (at least two weeks; for sudden sickness as early as you are able).

## Getting help

If you have any feedback, problems, questions or want to chat, please do not hesitate to drop by at my office.

## Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards, <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu> or to the Department of Public Safety <http://adminopsnet.usc.edu/department/department-public-safety>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

### Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with

disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.