Math 4213/5213 Course Outline

Winter 2023

Instructor: A.J. Dean, **email:** andrew.j.dean@lakeheadu.ca

Office hours: By zoom appointment.

References:

Bhatia, Rajendra *Notes on Functional Analysis.* Texts and Readings in Mathematics, **50**. Hindustan Book Agency, New Delhi, 2009. x+237 pp. ISBN: 978-81-85931-89-0

Blackadar, B. *Operator Algebras. Theory of C^*-algebras and von Neumann Algebras.* Encyclopaedia of Mathematical Sciences, **122**. Operator Algebras and Non-commutative Geometry, III. Springer-Verlag, Berlin, 2006. xx+517 pp. ISBN: 978-3-540-28486-4

Halmos, Paul Richard *A Hilbert Space Problem Book.* Second edition. Encyclopedia of Mathematics and its Applications, **17**. Graduate Texts in Mathematics, **19**. Springer-Verlag, New York-Berlin, 1982. xvii+369 pp. ISBN: 0-387-90685-1

Kesavan, S. *Functional Analysis.* Second corrected reprint of the 2009 original. Texts and Readings in Mathematics, **52**. Hindustan Book Agency, New Delhi, 2017. xii+269 pp. ISBN: 978-93-80250-62-5

Kreyszig, Erwin *Introductory Functional Analysis with Applications.* Wiley Classics Library. John Wiley & Sons, Inc., New York, 1989. xvi+688 pp. ISBN: 0-471-50459-9

Kubrusly, Carlos S. *Spectral Theory of Operators on Hilbert Spaces.* Birkhäuser/Springer, New York, 2012. x+197 pp. ISBN: 978-0-8176-8327-6

Pedersen, Gert K. *Analysis Now.* Graduate Texts in Mathematics, **118**. Springer-Verlag, New York, 1989. xiv+277 pp. ISBN: 0-387-96788-5

Schmüdgen, Konrad *Unbounded Self-adjoint Operators on Hilbert Space.* Graduate Texts in Mathematics, **265**. Springer, Dordrecht, 2012. xx+432 pp. ISBN: 978-94-007-4752-4

Learner Outcomes: Successful students of this course will be able to understand, explain, and use the main theorems concerning: normed spaces, including Baire category, dual spaces, and weak topologies; inner product spaces, including operators on Hilbert spaces, compact operators, and the trace; and spectral theory, including Banach algebras, the Gelfand transform, and the spectral theorem for normal operators. Time permitting, the spectral theory of unbounded operators may also be discussed. Students will also learn to present mathematical proofs in functional analysis at a blackboard to an audience of their peers in a clear and effective manor.

Marking Scheme: Grades will be based on weekly assignments. There will be 11 of these. They will be weighted equally, with the lowest grade being dropped. The assignments will be taken up in class, with students presenting some of their solutions. A portion of the marks will be allocated to the presentation of solutions.

Drop Date: The final date to withdraw from this course without academic penalty is Friday March 10.

Academic Dishonesty: All cases of academic dishonesty will be dealt with according to the university's Academic Integrity Code.

Accommodations: Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. if you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit: http://studentaccessibility.lakeheadu.ca