Linear Analysis

Math 516 – Lecture A1

September – December 2004

Time and Place: TR 9:30 – 10:50, CAB 657.

Instructor: Alexander Litvak
Office: CAB 525, tel: 492-3397, e-mail: alexandr@math.ualberta.ca
Homepage: http://www.math.ualberta.ca/~alexandr/
Office Hours: TR 11:00–12:00 or by appointment.

Recommended books (no textbook needed):

1. B. Bollobas, Linear Analysis. *An Introductory Course*, Second Edition. Cambridge University Press, 1999.
2. J.B. Conway, *A Course in Functional Analysis*, Springer Verlag, 1985.
3. N. Dunford and J.T. Schwartz, *Linear Operators*, I. Wiley-Interscience, 1988.
4. M. Fabian, P. Habala, P. Hajek, V. Montesinos, J. Pelant and V. Zizler, *Functional Analysis and Infinite dimensional Geometry*, Canad. Math. Soc. Books in Math. 8 (Springer-Verlag 2001).
5. L.V. Kantorovich, G.P. Akilov, *Functional analysis*, Translated from the Russian by Howard L. Silcock. Second edition. Pergamon Press, Oxford-Elmsford, N.Y., 1982.
6. W. Rudin, *Functional Analysis*, Second Edition. McGraw-Hill, 1991.
7. V. Runde, *Math 516 - Linear Analysis*, Lecture notes, http://www.math.ualberta.ca/~runde/math516.html.

Prerequisite: Math 418 or equivalent.

Topics to be covered:

1. Normed spaces and Banach spaces;
2. The principles of functional analysis: the Hahn-Banach theorem, the uniform boundedness principle (the Banach-Steinhaus theorem), the open mapping theorem, the closed graph theorem;
3. Hilbert spaces and orthonormal bases;
4. Spectral theory of compact normal operators;
5. Fixed point theorems with applications.

Grading Policy:

Your course grade will be based upon your marks in examinations and assignments weighted as follows:

50%	Final (09:00–12:00, CAB 657, Wednesday, December 15)
30%	Midterm (9:30–10:50, CAB 657, Thursday, October 28)
20%	Assignments

There is no deferred midterm. If you qualify for an excused absence on a midterm the weight will be transferred to the final exam. If you miss the final exam and obtain a formal (in writing) University accepted excuse for your absence you might write a **deferred exam** on Saturday, **January 15, 2005** at 9:00–12:00 in CAB 243.

Assignments: Homework problems will be assigned in every lecture and all the problems assigned in the current week will be due at the **beginning** of the Thursday class of the next week in the lecture room CAB 657. **Please note**, late assignments will not be accepted. **The solutions** will be posted at my homepage as well as on Bulletin board # 9*b*, opposite CAB 529. The assignments solution will also be available in Cameron Library (main floor). Ask for the file F16 (MATH 516) at the desk on your right after you pass through the security area. I **strongly recommend** that you do all the drill problems that will be recommended each week together with the assignment.

Dates: First Class: Sept. 9; Midterm exam: Oct. 28; Remembrance Day: Nov. 11 (no classes are held); Last class: Dec. 7; Final exam: Dec. 15; Deferred exam: Jan. 15.

Additional announcements:

1. As usual there will be Functional Analysis Seminar this year. If you are interested in participating, could you please provide me your schedule and e-mail address, so we could find time convenient to everybody.

2. The following two courses could be interesting for you:

a. Fall 2004 (MWF 14:00-14:50): *"Topics in Functional Analysis: Introduction to Operator Spaces"* (MATH 617) by V. Runde.

b. Winter 2005: *"Operator theory and operator algebras"* (MATH 519) by V. Troitsky. Please note that books [2, 3, 4] are also recommended for MATH 519 among others.