

# 100471

## Functional Analysis Spring 2010

Instructor:	Götz Pfander, Research I, Room 112, Tel. 3211, Office Hour: by appointment. e-mail: <a href="mailto:g.pfander@jacobs-university.de">g.pfander@jacobs-university.de</a> .																														
Teaching Assistant:	TBA Office Hour: TBA																														
Lectures:	Mondays, 11:15-12:45, East Hall 2 Wednesdays, 14:15-15:30, East Hall 2																														
Tutorials:	TBA																														
Textbook:	“A course in functional analysis”, John B. Conway, Springer Verlag																														
Reading:	“Real Analysis”, H. L. Royden, Macmillan. “Real and Complex Analysis”, Walter Rudin, McGraw-Hill, Inc. “Measure and Integral”, Richard L. Wheeden and Antoni Zygmund, Dekker. “Funktionalanalysis”, Dirk Werner, Springer-Verlag.																														
Grading:	Your grade is determined by how many points you obtain out of 1000 possible points, i.e., the grade is assigned according to the table on the right. Points can be collected via Homework (300 pts), Quizzes (200 pts), Midterm Exam (200 pts) and Final (300 pts).	<table><tr><th>Point range</th><th>Grade</th></tr><tr><td>950 - 1000</td><td>1.00</td></tr><tr><td>905 - 949</td><td>1.33</td></tr><tr><td>860 - 904</td><td>1.67</td></tr><tr><td>815 - 859</td><td>2.00</td></tr><tr><td>770 - 814</td><td>2.33</td></tr><tr><td>725 - 769</td><td>2.67</td></tr><tr><td>680 - 724</td><td>3.00</td></tr><tr><td>635 - 679</td><td>3.33</td></tr><tr><td>590 - 634</td><td>3.67</td></tr><tr><td>545 - 589</td><td>4.00</td></tr><tr><td>500 - 544</td><td>4.33</td></tr><tr><td>455 - 499</td><td>4.67</td></tr><tr><td>0 - 454</td><td>5.00</td></tr></table>	Point range	Grade	950 - 1000	1.00	905 - 949	1.33	860 - 904	1.67	815 - 859	2.00	770 - 814	2.33	725 - 769	2.67	680 - 724	3.00	635 - 679	3.33	590 - 634	3.67	545 - 589	4.00	500 - 544	4.33	455 - 499	4.67	0 - 454	5.00	
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Homework:	Seven problem sets will be assigned during the semester. Each homework is worth 50 points; the sum of your best six homework scores will determine your total homework score, i.e., your worst homework score is dropped at the end of the semester. The homework is due in class as indicated on the schedule. Every day you hand in your homework late will be penalized by a deduction of 5 points from the respective homework score.																														
	We encourage you to discuss homework problems with fellow students. However, the homework you hand in may not be copied and must reflect your own understanding of the material.																														
Quizzes	Four quizzes will be given in class (see schedule), each carrying 50 points. Quizzes will be 10 minute closed book examinations.																														
Exams:	The midterm exam is worth 200 points. The final exam, worth 300 points, will be scheduled within finals week.																														

The material used as well as the rules for the exam will be announced one week prior to the exam.

**Prerequisites:** The course is open to all graduate students. For undergraduate students, the formal prerequisite is Real Analysis, in particular, we will assume familiarity with Lebesgue integration theory and  $L^p$  spaces. If you would like to take the course, but you are missing the prerequisite, contact the instructor who will consider a waiver of regulation.

**Syllabus:** This course assumes basic knowledge of measure and integration theory, and of classical Banach and Hilbert spaces of measurable functions. Functional analysis focuses on the description, analysis, and representation of linear functionals and operators defined on general topological vector spaces, most prominently on abstract Banach and Hilbert spaces.

The material covered includes the Hahn Banach theorem, the uniform boundedness principle and consequences, locally convex spaces, weak topologies tempered distributions, some Fourier analysis and spectral theory.

**Schedule:**

	Mon	Tue	Wed	Thu	Fri	
<b>W1</b>	1-Feb	2-Feb	3-Feb	4-Feb	5-Feb	
<b>W2</b>	8-Feb	9-Feb	10-Feb	11-Feb	12-Feb	HW 1 due
<b>W3</b>	15-Feb	16-Feb	17-Feb	18-Feb	19-Feb	Quiz 1
<b>W4</b>	22-Feb	23-Feb	24-Feb	25-Feb	26-Feb	HW 2 due
<b>W5</b>	1-Mrz	2-Mrz	3-Mrz	4-Mrz	5-Mrz	Quiz 2
<b>W6</b>	8-Mrz	9-Mrz	10-Mrz	11-Mrz	12-Mrz	HW 3 due
<b>W7</b>	15-Mrz	16-Mrz	17-Mrz	18-Mrz	19-Mrz	Quiz 3
<b>W8</b>	22-Mrz	23-Mrz	24-Mrz	25-Mrz	26-Mrz	HW 4 due MT
<b>W9</b>	29-Mrz	30-Mrz	31-Mrz	1-Apr	2-Apr	
<b>W10</b>	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	
<b>W11</b>	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr	HW 5 due
<b>W12</b>	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	Quiz 4
<b>W13</b>	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr	HW 6 due
<b>W14</b>	3-Mai	4-Mai	5-Mai	6-Mai	7-Mai	
	10-Mai	11-Mai	12-Mai	13-Mai	14-Mai	HW 7 due