The syllabus of Functional Analysis

<table>
<tr><td colspan="6">课程基本信息（Course Information）</td></tr>
<tr><td>课程代码
（Course Code）</td><td>MA3131
/MA308</td><td>学时
（Credit Hours）</td><td>64</td><td>学分
（Credits）</td><td>4</td></tr>
<tr><td rowspan="2">课程名称
（Course Name）</td><td colspan="5">（中文）泛函分析</td></tr>
<tr><td colspan="5">（英文）Functional Analysis</td></tr>
<tr><td>课程属性
(Course Type)</td><td colspan="5">专业选修课</td></tr>
<tr><td>开课院系
（School）</td><td colspan="2">Department of Mathematics</td><td>开课学期
（Term）</td><td colspan="2">Spring Semester, 2015</td></tr>
<tr><td>先修课程
（Prerequisite course）</td><td colspan="5">Mathematical Analysis, Linear Algebra</td></tr>
<tr><td>授课教师
（Instructors）</td><td colspan="5">Congming Li, Chunjing Xie</td></tr>
<tr><td>课程简介（Description）
300-500 字</td><td colspan="5">Functional Analysis is the core course for the modern analysis. It is about the analysis on infinitely dimensional linear spaces. It is natural continuation for both mathematical analysis and linear algebra. Functional analysis plays an important role in the study for the partial differential equations and mathematical foundation for quantum mechanics.</td></tr>
<tr><td colspan="6">课程教学大纲（course syllabus）</td></tr>
<tr><td>*学习目标(Learning Outcomes)</td><td colspan="5">After completing the course, students should:
1. Understand the basic concepts of functional analysis
2. Learn how to illustrate the abstract notions in functional analysis via examples
3. Learn how to solve the problems appear in PDEs via the powerful tools from functional analysis
4. get a solid training for advanced courses on modern analysis</td></tr>
<tr><td>*教学内容、进度安排及要求
(Class Schedule & Requirements)</td><td colspan="5"><table>
<tr><th>教学内容
topics</th><th>学时
Credit hours</th><th>教学方式
Teaching methodology</th><th>作业及要求
tasks</th><th>基本要求
Intended learning outcomes</th><th>考查方式
Assessment methods</th></tr>
<tr><td>Metric spaces</td><td>6</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Linear Spaces</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Linear Maps</td><td>4</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Hahn-Banach Theorem</td><td>4</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Applications of</td><td>2</td><td></td><td></td><td></td><td></td></tr>
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	Hahn-Banach Theorem					
	Normed Linear Spaces	4				
	Hilbert Spaces	4				
	Applications of Hilbert Spaces	2				
	Duals of Normed Linear Spaces	4				
	Weak convergence	4				
	Weak and weak* topology	2				
	Bounded Linear Maps	4				
	Examples of Bounded Linear Maps	4				
	Elementary Spectral theory	4				
	Examples of operators and their spectra	2				
	Compact maps	4				
	Two midterms, one review class, one final exam, one homework for every two weeks					
考核方式 (Assessment methods and Grading)	Homework 20%; two midterm exams 30% (1st midterm exam 15%, 2nd midterm exam 15%); final exam 50%					
教材或参考资料 (Textbooks & Other Reading Materials)	Functional Analysis, Peter Lax, Higher Education Press; Notes on Functional Analysis by John Hunter					
备注 （Notes）						