1. **Catalog Description of the Course.**

**Math 511 FUNCTIONAL ANALYSIS (3)**  
Three hours of lecture per week  
Prerequisite: Admission to the Computer Science or Mathematics Graduate Program  
Topics include: metric spaces, function spaces, normed vector spaces, linear operators. Banach spaces, Hilbert space, Spectral theory, and fundamental theorems in functional analysis. Applications in various fields including computer science, bioinformatics, statistical analysis.

2. **Mode of Instruction.**

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<tr>
<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
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<td>Lecture</td>
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<tr>
<td>Seminar</td>
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<td>Laboratory</td>
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<td>Activity</td>
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3. **Justification and Learning Objectives.**

Justification: This course is an elective for students in MS in Applied Mathematics and MS in Computer Science.

Learning Objectives:

Through this course, students will be able to

- Understand the theoretical basis of the function spaces and normed spaces
- Work with metric and function spaces, linear operators, and spectral theory
- Analyze properties of various function spaces
- Apply functional analysis to various fields
- Express concepts and techniques of in oral and written form by constructing various proofs.

4. **Is this a General Education Course?**

No.

5. **Course Content in Outline Form.**

Topics:

a) metric spaces,  
b) function spaces,  
c) normed vector spaces,  
d) linear operators,  
e) Banach spaces,  
f) Hilbert spaces,  
g) Spectral theory,  
h) Fundamental theorems  
i) Applications in computer science, bioinformatics, statistical analysis.

6. **References.**

Texts:

7. List Faculty Qualified to Teach This Course.

All Mathematics faculty

8. Frequency.
   a. Projected semesters to be offered: Fall ___X___ Spring ___X___ Summer _____

9. New Resources Required.
   a. Computer (data processing), audio visual, broadcasting needs, other equipment
      none
   b. Library needs
      none
   c. Facility/space needs
      none

10. Consultation.
    Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

I. Grzegorczyk 10/31/03
Proposer of Course Date
Approvals

Program Coordinator          Date

GE Committee Chair          Date
(If applicable)

Curriculum Committee Chair  Date

Dean                        Date

Effective Semester: ____________________________
2. Program Areas: ______MATH

**Recommend Approval**

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<th>Education</th>
<th>ESRM</th>
<th>Humanities</th>
<th>Liberal Studies</th>
<th>Mathematics &amp; CS</th>
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* If needed