Matching New Course Request

Indiana University South Bend Campus

Check Appropriate Boxes: Undergraduate credit X Graduate credit Professional credit

1. School/Division: College of Liberal Arts & Sciences 2. Academic Subject Code: MATH
3. Course Number: M560 (must be cleared with University Enrollment Services) 4. Instructor: Carvalho, M.
5. Course Title: Applied Stochastic Processes

Recommended Abbreviation (Optional) (Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): Fall 2006
7. Credit Hours: Fixed at 3.0 or Variable from ________ to ________
8. Is this course to be graded S-F (only)? Yes ______ No X
9. Is variable title approval being requested? Yes ______ No X

11. Lecture Contact Hours: Fixed at 3.0 or Variable from ________ to ________
12. Non-Lecture Contact Hours: Fixed at ________ or Variable from ________ to ________
13. Estimated enrollment: 100 of which ________ percent are expected to be graduate students.
14. Frequency of scheduling: Fall-even yrs Will this course be required for majors? No
15. Justification for new course: To provide a new elective (possibly a core course) for MS program.
16. Are the necessary reading materials currently available in the appropriate library? Yes ______
17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.
18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.
19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: 
Department Chairman/Division Director 
Dean of Graduate School (when required)

Date 1/21/05 
Date 12/23/05

Approved by: 
Dean 
Chancellor/Vice-President

Date 11/18/05 
Date 12/21/05

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
September 21, 2005

CLAS Curriculum Committee

RE: New to IU South Bend Course Request
    MATH-M560 Applied Stochastic Processes

Dear Committee Members:

We would like to import the above-titled course for the M.S. Program in Applied Mathematics and Computer Science. The course will be taught by our new faculty member, Marcio Carvalho, who is a specialist in stochastic processes and simulation. We plan to offer the course fall semesters of even-numbered years. It will be an elective for graduate students, but may be later elevated to a core course. The Mathematical Sciences Curriculum Committee and the M.S. Program's Interdepartmental Graduate Committee have approved this proposal.

Thank you for your consideration of this request.

Sincerely,

Yu Song, Chair
Department of Mathematical Sciences
Sample outline of M560 Applied Stochastic Processes at IUSB

by Marcio Carvalho


1. **Probability Review** (about 3 weeks)
   - Events and Probability
   - Random variables
   - Conditional probability and expectation

2. **Poisson Process** (about 3 weeks)
   - Exponential distribution
   - Poisson process
   - Generalizations

3. **Markov Chains** (about 5 weeks)
   - Discrete chains
     - Kolmogorov equations
     - Transition probability matrix
     - Classification of states
     - Steady state distribution
     - Applications
   - Continuous-time chains
     - Birth and death processes
     - Transition probability function
     - Steady state distribution

4. **Introduction to Brownian Motion** (about 2 weeks)
   - Brownian motion from a random walk
   - Variations on Brownian motion
   - Applications

5. **Applications to Queueing Theory** (about 2 weeks)
   - M/M/1 model
   - M/M/s model
   - M/G/1 model
   - Finite and priority queues

There will be weekly homework assignments, two midterm tests, and a final exam.
To: Math Curriculum Committee and Graduate Committee
From: Marcio Carvalho, Department of Mathematical Sciences
Subject: Proposal to import course M560 Applied Stochastic Processes starting Fall 2006
Date: September 9, 2005

1. Justification for importing M560

Provide a course in stochastic processes to students in the graduate program.

Besides being just another option for an advanced course, possibly make it a core course (M560 and M575 make a great one year sequence), giving more flexibility to students, so they can choose core courses that better suit their interests and needs.

It also provides senior undergraduate students, who are interested in probability, with an elective course that will satisfy their degree requirements and their desire for applications of probability theory.

2. M560 on IU Bloomington Catalog

M560 Applied Stochastic Processes (3 cr.)
P: M343, M463, or consent of instructor.

3. Proposed M560 on IUSB Campus

Course name and description: Keep Bloomington's.

Frequency: The course shall be offered in the fall semester of every even numbered year.

Prerequisites: M463 or M365 or consent of instructor.

Intended topics: Same as Bloomington's (applications will probably come from queueing theory, in order for computer science students to benefit the most from it).