New Course Request

Check Appropriate Boxes: Undergraduate credit □ Graduate credit □ Professional credit □

School/Division Liberal Arts and Sciences  Academic Subject Code MATH

Course Number M576  (must be cleared with University Enrollment Services)

Instructor M. Shafii-Mousavi

Course Title Forecasting

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

First time this course is to be offered (Semester/Year): Spring 2004

Credit Hours: Fixed at 3 or Variable from ________ to ________

Is this course to be graded S-F (only)? Yes ___ No X

Is variable title approval being requested? Yes ___ No X

Course description (not to exceed 50 words) for Bulletin publication: P: MATH M301 Linear Algebra and a course in probability and statistics at the level of MATH M365 or higher. Forecasting systems, regression models, stochastic forecasting, time series, smoothing approach to prediction, model selection, seasonal adjustment, Markov Chains, Markov Decision Processes, and decision analysis.

Lecture Contact Hours: Fixed at 3 or Variable from __________ to __________

Non-Lecture Contact Hours: Fixed at __________ or Variable from __________ to __________

Estimated enrollment: 20 of which 75 percent are expected to be graduate students.

Frequency of scheduling: Every other year

Will this course be required for majors? YES □ see 15.

Justification for new course: Required for new MS in Applied Mathematics and Computer Science degree.

Are the necessary reading materials currently available in the appropriate library? YES

Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant. N/A

A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be an 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:  

Date 7/31/03

Department Chairman/Division Director

Approved by:  

Date 10/22/03

Dean

Date

Chancellor/Vice-President

Date

University Enrollment Services

Date

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.

UPS 724
I am proposing a new course M576 *Forecasting* to be included in the IUSB mathematics curriculum. This course is at the graduate level and it is suitable for graduate students taking MS in Applied Mathematics and Computer Science, Education, and possibly MBA and Decision Science. The bulk of this course will be devoted to the mathematical methods applied to forecasting and applications.

Course Description: Forecasting systems, regression models, stochastic forecasting, time series, smoothing approach to prediction, model selection, seasonal adjustment, Markov Chains, Markov Decision Processes, and decision Analysis.

**Course Prerequisite:** M301 *Linear Algebra* and a course in probability and statistics at the level of M365 or higher.

**Course Content:**
- **Forecasting:**
  1. Principles of Forecasting
  2. Judgmental techniques
  3. Time Series
  4. Forecasting Procedures
     a. For a Constant-Level Model
     b. For a Linear-Level Model
     c. For a Constant Level with Seasonal Effects Model
  5. Forecasting Errors
  6. Box-Jenkins Method

- **Regression Analysis**

- **Markov Chains**
  1. Stochastic Processes
  2. Markov Chains
  3. Chapman-Kolmogorov Equations
  4. Classification of States of a Markov Chain
  5. First Passage Times
  6. Long-Run Properties of Markov Chains
  7. Absorption States
  8. Continuous-Time Markov Chains

- **Markov Decision Processes**
  1. Modeling Markov Chain Processes
  2. Optimal Policies
  3. Applications

- **Decision Analysis**
  1. Decision Making without Experimentation
  2. Decision Making with Experimentation
  3. Decision Trees
  4. Utility Theory
  5. Conclusions

**Textbooks:**
1. *Principles of Forecasting*, J. Scott Armstrong
2. *Introduction to Operations Research*, Frederick Hillier & Gerald J. Lieberman

**Evaluation:**
1. Two mid-terms and a final exam 67%
2. Project: Case Study 33%.