Course Change Request

Indiana University

South Bend Campus

Check Appropriate Boxes: Undergraduate credit [ ] Graduate credit [ ] Professional credit [ ]

1. School/Division: CLAS
2. Academic Subject Code: MATH
3. Current Course Number: M260
4. Current Credit Hours: 2
5. Current Title: Combinatorial Counting and Probability
6. Effective Semester/Year for changes listed below: Fall 2007
7. Instructor: Y. Cheng

Type of Change Requested: (Check appropriate boxes and indicate changes)

☐ 8. Change course number to: ____________________________ (must be cleared with University Enrollment Services)
☐ 9. Current course title: ____________________________
Change to: ____________________________
Recommended abbreviation (optional) ____________________________
(Use additional paper if necessary)

☐ 10. Current credit hours fixed at: 2 or variable from: ___ to ___
     Change to credit hours fixed at: ___ or variable from: ___ to ___

☐ 11. Current lecture contact hours fixed at: ___ or variable from: ___ to ___
     Change to lecture contact hours fixed at: ___ or variable from: ___ to ___

☐ 12. Current non-lecture contact hours fixed at: ___ or variable from: ___ to ___
     Change to non-lecture contact hours fixed at: ___ or variable from: ___ to ___

☐ 13. Is this course currently graded with S/F (only) grades? Yes [X] No
     Change to S/F (only) grading? Yes [X] No

☐ 14. Does this course presently have variable title approval? Yes [X] No
     Is variable title approval being requested? Yes [X] No

☐ 15. Is this course being discontinued? Yes [X] No

☐ 16. Current course description: Permutations, combinations, counting principles, tree diagrams, binomial theorem, statistical experiments, conditional probability, independent events, random variables, probability density, cumulative distribution, expected values, standard deviations, binomial, Poisson, normal distribution, and the central limit theorem. Credit not given for both MATH-M260 and MATH-M363.
     Change course description to: (not to exceed 50 words)

☐ 17. Justification for change: ____________________________

☐ 18. Are the necessary reading materials currently available in the appropriate library? Yes [X] No

☐ 19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of this course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please send a list of departments, schools, or divisions that consulted.

Submitted by:

Date: 12-12-06

[Signature]

[Name]

[Title]

[Department/Division/Institution]

[Address]

[City, State, Zip]

University Enrollment Services

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

UPS 725

University, Enroll. Services (Bldg.-Math. Jan.) Vice President—Info. School/Division Mailroom. Department/Division/Post Office Enrollment Services, Admissions—White
The Intended Topics of MATH-M260

Proposed for 3-credit hours
(The course is calculus based)
February 6, 2007

M260 Combinatorial Counting and Probability

1. Combinatorial counting (5 weeks)
   - Cords, vines, diagrams for the multinomial
   - The multiplication principle
   - Permutations and combinations
   - Addition principle
   - Complementarity principle
   - Inclusion/Exclusion principle
   - Tree diagrams (when all else fails)
   - Binomial Theorems of Algebra
   - The pigeon hole principle

2. Discrete Probability (7 weeks)
   - Statistical experiments and sample spaces, events
   - Probability Axioms: complementarity, Inclusion/Exclusion
   - Equally likely outcomes
   - Conditional probability; chain rule; tree diagrams with conditional probabilities
   - Bayes' Theorem (Optional)
   - Independent Events (May need to introduce infinite series here)
   - Repeated trials until an acceptable outcome
   - Discrete random variables and their probability density functions
   - Cumulative distribution functions for discrete random variables
   - Expected values, variances, and standard deviations of discrete random variable
   - Theorems to simplify computation of expected values (e.g., symmetry, indicator random variable)
   - Binomial random variables
   - Conditional expected values, $E(X|A)$
   - Poisson random variable

3. Continuous probability Distributions (3-4 weeks)
   - Basic ideas: probability density functions, probabilities, expected values, variances, and standard deviations
   - Exponential distribution
   - Normal random variables
   - Central Limit Theorem
   - Approximation of Binomial probabilities with the normal distribution
Memorandum

To: CLAS Curriculum Committee
From: Department of Mathematical Sciences
Date: November 27, 2006
Subject: Changing MATH-M260 from 2 credit hours to 3 credit hours, effective Fall 07

Justification for increasing one credit-hour:

MATH-M260, Combinatorial Counting and Probability, and MATH-M261, Statistical Inferences, were proposed in the fall of 2003. The sequence was specifically designed for computer science (CS) students. MATH-M260 has been offered every fall since 2004. After teaching the course three times, the instructor (Yi Cheng) has determined the following facts and concerns.

The proposed topics (mainly from Dr. Knight) in counting and probability are necessary in order to serve as a prerequisite for some CS courses. However, the proposed curriculum, in terms of quantity, is too ambitious for a 2 credit-hour course. There is not enough time to cover the proposed topics. Based on my experiences, it takes at least 1/3 of the second semester time from M261 to finish what was supposed to be covered in M260. Consequently, with the current set-up, M260 is neither a complete probability course, nor is M261 a complete statistics course. Increasing the credit hours for M260 from 2 to 3 is a realistic solution that will allow us to cover the counting and probability in a single semester and make the sequence sufficient as the prerequisite for other CS courses.

Consensus from CS departments:

The proposal has been approved by the Chair and the faculty members of the CS department.

Course description of M260 Combinatorial Counting and Probability (no change)

Permutations, combinations, counting principles, tree diagrams, binomial theorem, statistical experiments, conditional probability, independent events, random variables, probability density, cumulative distribution, expected values, standard deviations, binomial, Poisson, normal distribution, and the central limit theorem. Credit not given for both MATH-M260 and MATH-M365.