

**College of Arts & Sciences**

**Biological Sciences**  
**Proposed Program Changes**

**1. Name and summary of current program:**

Integrative Biology

**2. New program name (if name is being changed):**

Same name

**3. Description of proposed change(s):**

The text below should substitute the text in the 2003-2004 course catalog, page 116, left-hand column, last paragraph, starting "Core courses: BioS 439 . . ." until the end of the paragraph:

All students must take 4 courses, with at least one from each of the three core areas: (1) Behavior/Evolution – BioS 439 Advanced Behavioral Neuroscience, BioS 409 Evolutionary and Functional Morphology; (2) Neurobiology I – BioS 453 General Neuroanatomy, BioS 457 Advanced Behavioral Neuroendocrinology; (3) Neurobiology II – BioS 416 Neurophysiology and Memory, BioS 450 Developmental Neurobiology. All core courses will be offered at least every second year. In addition, one year of graduate level statistics is required – either Psyc 421 and 422 Statistical Analysis of Psychological Data or Educ 410 and 411 Univariate and Multivariate Statistics, as well as BioS 406 Biological Sciences Seminar, BioS 408 Responsible Conduct of Science, and BioS 401 Professional Graduate Skills (strongly recommended to be taken in the first two years of the program). Two additional elective courses are required and may be chosen from core courses not used to fulfill core requirements or BioS 429 Advances in Herpetology, BioS 445 Systematics and Evolution, BioS 411 Advanced Cell Biology, BioS 421 Molecular Cell Biology I (prerequisite is BioS 345), BioS 371 Elements of Biochemistry I, BioS 372 Elements of Biochemistry II (prerequisite is BioS 371), or BioS 471 Elements of Eukaryotic Biochemistry (prerequisite is BioS 372 or BioS 411 or permission of instructor).

**4. Rationale for proposed change(s):**

These changes update the Integrative Biology graduate curriculum to include courses offered by new faculty members. It improves upon the current curriculum to provide the broad, interdisciplinary training intended for students in the Integrative Biology graduate program.

**5. Academic Impact Statement:**

**a. Is this program interdisciplinary?**

Yes, it is interdisciplinary. It includes Statistics courses offered from the Department of Psychology or the College of Education and well as a wide array of courses from the Department of Biological Sciences (Biochemistry, Molecular Biology, Neuroscience, Neuroanatomy, etc.)

**b. Identify any known effects of the proposed changes on other programs at the University.**

**c. If there are known effects, individuals in charge of the affected programs must be consulted about the proposed program changes and the following information provided:**

**(1) Who was consulted?**

These changes were agreed upon by Department of Biological Sciences faculty who are most involved in the Integrative Biology graduate curriculum, and were approved by the department Graduate Committee.

**(2) Are the proposed changes acceptable to all affected programs?**

Yes

**(3) Will any modifications be required to the affected programs? If so, describe.**

No

**d. Identify any known effects of the proposed program changes on the University's commitment to diversity.**

**6. Resource Impact Statement:**

**a. Provide each of the following regarding the proposed changes:**

**(1) Library impact statement**

Life science collections are inadequate and improvements need to be made to journal collections and access to collections.

**(2) Computer impact statement**

None

**(3) Faculty impact statement**

The courses will be delivered by existing faculty members.

**(4) Facilities impact statement**

None

**b. Provide a statement indicating who will assume financial responsibility for any new resources required:**

Additional library needs should be available through enhancements associated with new hires in the Department. Other costs will be borne by the department.

**English**  
**Proposed Program Changes**

**6. Name and summary of current program: Master of Arts Program in English**  
Thirty credit hours including 3 credits of "thesis."

**7. New program name (if name is being changed): Same**

**8. Description of proposed change(s):**  
Thirty-three credit hours including 3 credits of "thesis."

**9. Rationale for proposed change(s):**

1. The added course will provide a stronger generalist training at the MA level and serve as a foundation for a more focused "specialist" Ph.D. exam.

2. The additional course will create a solid two-year MA program. As it is now MA students in their fourth semester often begin taking courses which count toward the Ph.D. before completing the MA because their fourth semester requires only 3 or 6 hours of MA course work. This new requirement will make it logical for all students newly accepted into our Ph.D. program, whether they received their MA from Uchigh or elsewhere, to begin together in the fall semester.

**10. Academic Impact Statement:**

a. **Is this program interdisciplinary?** No.

b. **Identify any known effects of the proposed changes on other programs at the University.**  
None.

c. **If there are known effects, individuals in charge of the affected programs must be consulted about the proposed program changes and the following information provided:**

(1) **Who was consulted?**

(2) **Are the proposed changes acceptable to all affected programs?**

(4) **Will any modifications be required to the affected programs? If so, describe.**

d. **Identify any known effects of the proposed program changes on the University's commitment to diversity.**  
None.

**6. Resource Impact Statement:**

a. **Provide each of the following regarding the proposed changes:**

**(1) Library impact statement**

None.

**(2) Computer impact statement**

None.

**(3) Faculty impact statement**

The graduate courses we already offer can absorb the additional five or six student courses each year.

**(4) Facilities impact statement**

None.

**b. Provide a statement indicating who will assume financial responsibility for any new resources required:**

No new financial resources are necessary.

**Biological Sciences**  
**Proposed Course Changes**

**11. Current course number and course description (from course catalogue):**

**BioS 409. Evolutionary and Functional Morphology (3)** Readings in the current literature demonstrations and laboratory exercises exploring the applications of comparative methods to the analysis of evolutionary patterns at a range of morphological levels (molecular and macroscopic). Students will also learn experimental approaches to testing relationships between form and function in vertebrates. Emphasis will be on the musculoskeletal and nervous systems. Prerequisite BioS 134 Comparative Vertebrate Anatomy BioS 317 Evolution and EES 361 Animal Physiology or permission of instructor

**BioS 429. Advances in Herpetology (3)** Lectures and readings from the primary literature on current research in amphibian and reptilian biology. Two lectures, one discussion session and one laboratory or field trip. In addition, a week-long field trip during spring vacation is required. Not open to students who have received credit for BioS 329.

**12. Proposed course number and course description (as it will appear in course catalogue):**

**BioS 409. Evolutionary and Functional Morphology (3)** Readings in the current literature, demonstrations and laboratory exercises exploring the applications of comparative methods to the analysis of evolutionary patterns at a range of morphological levels (molecular and macroscopic). Students will also learn experimental approaches to testing relationships between form and function in vertebrates. Emphasis will be on the musculoskeletal and nervous systems. Prerequisites BioS 234 Comparative Vertebrate Anatomy BioS 317 Evolution or permission of instructor.

**BioS 429. Advances in Herpetology (3)** Lectures and readings from the primary literature on current research in amphibian and reptilian biology. Two lectures, one discussion session and one laboratory or field trip. Not open to students who have received credit for BioS 329.

**13. Description of proposed change(s):**

BioS 409 – The proposed change is editorial and reflects the correct course number for the prerequisite course Comparative Vertebrate Anatomy (BioS 234).

BioS 429 – The proposed change better reflects the nature of the course and the course expectations.

**14. Rationale for proposed change(s):**

The proposed changes were submitted by the course instructor Dr. David Cundall, and are simply editorial.

**15. Resource Impact Statement:**

None.

Earth & Environmental Sciences  
Proposed Course Changes

16. Current course number and course description (from course catalogue):

**EES 473. Aqueous Geochemistry (3)**

**Advanced study of physical and inorganic aqueous geochemistry, including homogeneous and heterogeneous equilibria, kinetics, and surface processes in water-rock systems. Computational modeling of water-rock systems. Prerequisites: computer programming (C, Pascal, or Fortran), and consent of instructor. Moscs**

17. Proposed course number and course description (as it will appear in course catalogue):

**EES 473. Aqueous Geochemistry (3)**

**Advanced study of the equilibria and kinetics of chemical reactions occurring at the earth's surface. A review of concepts in geochemistry including activity, solubility, thermodynamics, kinetics, and oxidation-reduction reactions is followed by readings from the literature. Topics covered depend on student interest, and have included chemical weathering, chemical evolution of surface and groundwater, acid mine drainage, trace element chemistry, biogeochemical cycles, and ocean chemistry. May be repeated for credit. Prerequisites: Graduate standing in EES or permission of the instructor. Peters.**

18. Description of proposed change(s):

**Text changed to more accurately describe the material covered in the course.  
Removed the computer programming prerequisite.**

19. Rationale for proposed change(s):

**The current course description does not accurately describe what is covered in this course. The updated text more accurately reflects the covered material. While the students may be asked to write a simple computer program, prior knowledge of C, Pascal or Fortran is not necessary.**

20. Resource Impact Statement:

**EES 473 has a long history of instruction in our Department. There are sufficient in house and library resources, including journals, in place to support this course. There is no anticipated new need for graduate TAs for this class.**

**History**  
**Proposed Course Changes**

**Current course number and course description (from course catalogue):**

**Hist 438 Techniques in Public History (2)**

Designed to introduce students to a variety of public history techniques. Instructor will focus on one of the following topics each term: archives, documentary film, exhibit design, historical editing, material culture, oral history. May be repeated to a maximum of 8 credits.

**Proposed course number and course description (as it will appear in course catalogue):**

**Hist 438 Techniques in Public History (2-3)**

Same description

**Description of proposed change(s):**

Offer course for either 2 or 3 credits at the graduate level. Any single offering will be either 2 or 3 credits.

**Rationale for proposed change(s):**

Hist 438 Techniques in Public History (which is paired with Hist 338) allows flexibility in course offerings in the Public History program, eliminating the need for separate courses in archival management, oral history, etc. In offering the courses, however, we have learned that some areas, such as archival management, require a full semester course while others require only a half-semester. We will request a similar change for Hist 338.

**Resource Impact Statement:**

**This change will have no impact on college or library resources.**

**Mathematics**  
**Proposed Course Changes**

**1 Current course number and course description (from course catalogue):**

**Math 310. Probability and Its Applications (3-4) spring**

Continuation of Math 309. Random variables, characteristic functions, limit theorems; stochastic processes, Kolmogorov equations; Markov chains, random walks. Prerequisite: Math 309 or consent of the department chair. (MA)

**Stat 410. Probability and Its Applications (3) spring**

See Math 310.

**21. Proposed course number and course description (as it will appear in course catalogue):**

**Math 310. Random Processes and Applications (3-4) spring**

Theory and applications of stochastic processes. Limit theorems, introduction to random walks, Markov chains, Poisson processes, birth and death processes, and Brownian motion. Applications to financial mathematics, biology, business and engineering. Prerequisites: Math 309 or Math 231.

**Stat 410. Random Processes and Applications (3) spring**

See Math 310

**22. Description of proposed change(s):**

As described above.

**23. Rationale for proposed change(s):**

Rationale: The change in description reflects the evolution of the course over time. The change in prerequisites reflects the actual material presupposed. The new title is more specific and better describes the course.

**24. Resource Impact Statement:**

None.

## Proposed Course Changes

**1. Current course number and course description (from course catalogue):**

**Math 312. Computational Statistics (3-4)**

Exploratory data analysis; Monte Carlo methods; randomization and resampling. Computational aspects based on software tools and statistical packages. Prerequisite: Math 12 or Math 231. (MA)

**Stat 412. Computational Statistics (3-4)**

See Math 312.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**Math 312. Statistical Computing and Applications (3-4)**

Use of statistical computing packages; exploratory data analysis; Monte Carlo methods; randomization and resampling, application and interpretation of a variety of statistical methods in real world problems. Prerequisite: Math 12 or 231. (MA)

**Stat 412. Statistical Computing and Applications (3)**

See Math 312.

**3. Description of proposed change(s):**

As described above.

**4. Rationale for proposed change(s):**

Rationale: Emphasizing the applications of statistics should make this course more useful.

**5. Resource Impact Statement:**

None.

## Proposed Course Changes

**1. Current course number and course description (from course catalogue):**

**Math 338. Regression Analysis (3-4) spring**

Least square principles in multiple regression and their interpretations; estimation, hypothesis testing, confidence and prediction intervals; residual analysis, multicollinearity, selection of regression models; comparison of data sets, analysis of variance and covariance, simultaneous inference procedures. Use of computer packages for statistical analysis. Prerequisite: Math 12 or 231. (MA)

**Stat 438. Regression Analysis (3) spring**

See Math 338.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**Math 338. Linear Models in Statistics (3-4) spring**

Least square principles in multiple regression and their interpretations; estimation, hypothesis testing, confidence and prediction intervals; residual analysis, multicollinearity, selection of regression models, analysis of variance and covariance; general linear models, principal component analysis. Use of computer packages. Prerequisite: Math 12 or 231. (MA)

**Stat 428. Linear Models in Statistics (3)**

See Math 338.

**3. Description of proposed change(s):**

As described above.

**4. Rationale for proposed change(s):**

Rationale: The new title emphasizes the breadth of the course. Adding principal component analysis should make the course more useful.

**5. Resource Impact Statement:**

None.

### Proposed Course Changes

**1. Current course number and course description (from course catalogue):**

**Math 404. Mathematical Logic (3)**

Topics in quantification theory relevant to formalized theories, recursive functions. Gödel's incompleteness theorem; algorithms and computability.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**Math 404. Topics in Mathematical Logic (3)**

Intensive study of topics in mathematical logic. Prerequisite: Consent of the department chair. May be repeated for credit.

**3. Description of proposed change(s):**

As described above.

**4. Rationale for proposed change(s):**

Rationale: This better reflects the fact that this is a special topics course.

**5. Resource Impact Statement:**

None.

## Proposed Course Changes

**1. Current course number and course description (from course catalogue):**

**Math 467. Financial Calculus I (3) fall**

Basic mathematical concepts behind derivative pricing and portfolio management of derivative securities. Development of Arbitrage Pricing Theory in the context of binomial model and Black-Scholes model. Option pricing in more realistic scenarios. Introduction to the theory of Brownian motion and Ito calculus (Stochastic Calculus). Prerequisites: Math 23, 43, 205, 12, or 231, or consent of instructor.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**Math 467. Financial Calculus I (3) fall**

Basic mathematical concepts behind derivative pricing and portfolio management of derivative securities. Development of hedging and pricing by arbitrage in the discrete time setting of binary trees and Black-Scholes model. Introduction to the theory of Stochastic Calculus, Martingale representation theorem, and change of measure. Applications of the developed theory to a variety of actual financial instruments. Prerequisites: Math 231 or Math 309 or consent of instructor.

**3. Description of proposed change(s):**

As described above.

**4. Rationale for proposed change(s):**

Rationale: The change in description reflects the evolution of the course over time. The change in prerequisites reflects the actual material presupposed.

**5. Resource Impact Statement:**

None.

## Proposed Course Changes

**1. Current course number and course description (from course catalogue):**

**Math 468. Financial Calculus II (3) spring**

Topics on continuous-time martingales, Brownian motion and Ito calculus. The absence of arbitrage opportunities and the existence of equivalent martingale measures, the pricing of contingent claims. Quantitative methods for portfolio management with the Capital Asset Pricing Model and Merton's continuous time dynamic models. Models for the random evolution of the term structure of interest rates. Prerequisite: Math 402, or Math 463 and 467, or consent of instructor.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**Math 468. Financial Calculus II (3) spring**

Models and mathematical concepts behind the interest rates markets. Heath-Jarrow-Morton model for random evolution of the term structure of interest rates and short rate models. Applications of the theory to a variety of interest rate contracts including swaps, caps, floors, swap-options. Development of multidimensional stochastic calculus and applications to multiple stock models, quantos, and foreign currency interest-rate models. Prerequisites: Math 467.

**3. Description of proposed change(s):**

As described above.

**4. Rationale for proposed change(s):**

Rationale: The change in description reflects the evolution of the course over time. Math 467 and 468 are a year sequence, so the appropriate prerequisite for Math 468 is Math 467.

**5. Resource Impact Statement:**

None.

**Political Science**  
**Proposed Course Changes**

**1. Current course number and course description (from course catalogue):**

**Drop: PolS 407, 411, 463, 469, 470, 471,**

**2. Proposed course number and course description (as it will appear in course catalogue):**

**3. Description of proposed change(s):**

**4. Rationale for proposed change(s):**

**PolS 411, 469, 470 – Professor who taught these courses has retired.**

**PolS 407 – Professor who taught this course has left the university.**

**PolS 463 and 471 – Will no longer be offered.**

**5. Resource Impact Statement:**

## **Biological Sciences**

### **Proposed New Course**

1. **Proposed new course number and course description (as it will appear in course catalogue):**

**BioS 401. Professional Skills for Biological Sciences Graduate Students**

(3) Students learn expectations and fundamental skills related to success in the biological sciences. The course is designed to help students make the most of their graduate education. Students learn the general principles underlying all fundable, publishable research, and how these general principles can be applied to their specific research areas. They learn to write and review manuscripts and grant proposals by serving on a mock editorial board and scientific review panel. They prepare and give oral presentations. Readings are from texts on scientific writing and research methods, and from original journal articles and grant proposal written by the faculty. No prerequisites. Required for all graduate students in the Integrative Biology Program.

**BioS 416. Neurophysiology and Memory (3)** Lectures and seminars on mechanisms of neuronal communication, the ability of neuronal networks to store and retrieve information, cellular basis for memory. Prerequisites: BioS 177 Behavioral Neuroscience, Phy 13 General Physics, or consent of instructor.

**BioS 450. Developmental Neurobiology (3)** Fundamental mechanisms underlying neural development. Early events leading to the induction of the neuroectoderm and the reorganization of the vertebrate central nervous system during adulthood and aging. Major developmental events such as phenotype commitment, cell migration, differentiation and growth cone guidance. Emphasis on the interplay between concepts emerging from organismal and molecular levels of analyses.

2. **Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

BioS 401 – Lecture and discussion course. 3 hours/week

BioS 416 – Lecture and discussion course. 3 hours/week

BioS 450 – Lecture course. 3 hours/week

3. **Rationale for proposed new course:**

The latter two courses will be offered by new faculty members (Maria Bykhovskaia and Colin Saldanha, respectively) and will cover subject matter in which these faculty members are expert. BioS 416 was offered for the first time last Spring and will be offered again in the Spring 2004 semester.

BioS 401 is designed to help graduate students make the most of their graduate experience. The course was offered as BioS 410 for the first time last spring to four third

year graduate students. These students enthusiastically endorsed the course, and suggested that it be offered early in the graduate curriculum, preferably in the first semester. This is a tough academic course by a demanding professor, and three credits reflect the large amount of reading and writing involved. For example, students give oral presentations on data they are collecting (biological science graduate students collect data in their first year), read and review primary literature in their field, and are taught to do so as though they are reviewers for scientific journals. They are assigned grant proposals and journal articles to read and review, just as if they were on an editorial board or on a federal granting agency review panel. Students have reading assignments from a text on scientific writing and oral presentation as well as on strong inference hypothesis testing. Professional development is a process of socialization. The alternative to a course like BioS 401 is informal socialization that will reflect narrow perspectives of a small number of faculty who have an opportunity to influence a student, dominated by the perspective of the student's research adviser. A number of recent publications (e.g., *Preparing Future Faculty*, NRC reports) urge us to instead design experiences that guide students through a consideration of issues like ethics, research proposal preparation (as opposed to experimental design), the structure of the profession, and the effective integration of research and teaching. In fact, the plans for the next NRC survey of doctoral programs include inquiring about the 'doctoral student environment,' including program characteristics like professional skills development. Our graduate students need structured opportunities to consider career options, as well. Not all of them are suited to or interested in academic careers, so we need to help them look ahead and envision ways of preparing for different paths. The amount of reading, writing, discussion, and oral presenting warrant three credits. The proposed timing makes perfect sense given the nature of the material and pedagogy, which are designed to prepare students for the work they will be doing as opposed to helping them to process work that they have done. Students in Biological Sciences are in faculty labs conducting research in the first semester, so they are ready to relate their professional development to concrete research issues.

All three courses are seen to be critical to the Integrative Biology graduate curriculum.

**4. Academic impact on programs affected by new course:**

**a. Is this proposed new course cross listed?**

No

**b. Identify any known effects of the proposed new course on other programs at the University.**

BioS 416 may be an elective course for undergraduate students in the Applied Life Science or Biocengineering programs.

**c. If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

**(1) Who was consulted?**

The department faculty members who are involved in the Integrative Biology graduate program were initially consulted. The new courses were approved by the department Graduate Committee.

- (2) **Is the proposed new course acceptable to all affected programs?**

Yes.

- (3) **Will any changes be required in the affected programs? If so, describe.**

No.

- d. **Identify any known effects of the proposed new course on the University's commitment to diversity.**

5. **Resource Impact Statement:**

- a. **Provide each of the following:**

- (1) **Library impact statement**

Life science collections are inadequate and improvements need to be made to journal collections and access to collections.

- (2) **Computer impact statement**

None

- (3) **Faculty impact statement**

The courses will be delivered by existing faculty members.

- (4) **Facilities impact statement**

None

- b. **Provide a statement indicating who will assume financial responsibility for any new resources required:**

Needed Library materials should be available through improvements associated with new faculty hires. Other costs will be borne by the department.

Earth & Environmental Sciences  
Proposed New Course

6. Proposed new course number and course description (as it will appear in course catalogue):

**EES 4xx. Advanced Topics in Geochemistry (1-6)**

**Intensive study of geochemical processes not covered in more general courses. May be repeated for credit.**

7. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:

**Lecture, independent study, other**

8. Rationale for proposed new course:

**Provide structure and credit for advanced graduate study in a specific area of geochemistry not covered in general geochemistry courses. Currently, EES has Advanced Topics courses rostered for Geophysics, Tectonics, Aquatic Ecosystems, and Modern and Quaternary Processes. Rostering a similar advanced topics course for geochemistry is important to serve the emerging graduate program of Steve Peters as well as the graduate programs of Gray Bebout, Peter Zeitler, and Carl Moses.**

9. Academic impact on programs affected by new course:

- e. Is this proposed new course cross listed?

**No**

- f. Identify any known effects of the proposed new course on other programs at the University.

**No known effects.**

- g. If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:

(4) Who was consulted?

(5) Is the proposed new course acceptable to all affected programs?

(6) Will any changes be required in the affected programs? If so, describe.

- h. Identify any known effects of the proposed new course on the University's commitment to diversity.

**No known effects.**

10. Resource Impact Statement:

- c. Provide each of the following:

- (5) Library impact statement

**Students may be asked to research literature topics in a specific topical area. The existing journal subscriptions will support student research needs.**

- (6) Computer impact statement

**Computers may be used as teaching tools, depending on student interest and topical area being covered. The existing computer labs in Williams Hall would function suitably for this course.**

- (7) Faculty impact statement

**This course would be taught on an as-needed basis by Peters, Zeitler, and/or Bebout as demand dictates.**

- (8) Facilities impact statement

**When taught, this course may require the use of a small classroom for 1-4 hours per week**

- d. Provide a statement indicating who will assume financial responsibility for any new resources required:

**The EES department would assume financial responsibility for any new resources.**

**Political Science**  
**Proposed New Course**

**11. Proposed new course number and course description (as it will appear in course catalogue):**

**PolS 468. Political Economy (3)**

Relationship of democratic politics to government and market, and significance of economic power in the American polity. Economic rationale for the place of the market and economic institutions in polity. Emphasis on information in comparison of economic approaches to public policy and organization (public goods, market failure and collective action) with traditional political science approaches (group mobilization and conflict, non-decisions, and symbolic action). Wurth

**12. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

Seminar – 3 contact hours per week

**13. Rationale for proposed new course:**

Course was previously in catalog as an undergraduate class but was mistakenly deleted. We are now requesting it also be added as a graduate class.

**14. Academic impact on programs affected by new course:**

- i. **Is this proposed new course cross listed?** No
- j. **Identify any known effects of the proposed new course on other programs at the University.**  
None
- k. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**
  - (7) **Who was consulted?**
  - (8) **Is the proposed new course acceptable to all affected programs?**
  - (9) **Will any changes be required in the affected programs? If so, describe.**
- l. **Identify any known effects of the proposed new course on the University's commitment to diversity.**

**15. Resource Impact Statement:**

- e. **Provide each of the following:**
  - (9) **Library impact statement**

None

## Proposed New Course

1. **Proposed new course number and course description (as it will appear in course catalogue):**  
**PolS 4XX. Legal Problems (3)**  
This course involves an examination of the role of legal rules, agents, institutions, and values in our society. Primary emphasis will be given to the American legal system, though we will evaluate U.S. principles and politics through a comparative lens as well. Pinaire
  
2. **Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**  
Seminar – 3 contact hours per week
  
3. **Rationale for proposed new course:**  
New faculty member.
  
4. **Academic impact on programs affected by new course:**
  - a. **Is this proposed new course cross listed?** No
  
  - b. **Identify any known effects of the proposed new course on other programs at the University.**  
None
  
  - c. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**
    - (1) **Who was consulted?**
    - (2) **Is the proposed new course acceptable to all affected programs?**
    - (3) **Will any changes be required in the affected programs? If so, describe.**
  
  - d. **Identify any known effects of the proposed new course on the University's commitment to diversity.**
  
5. **Resource Impact Statement:**
  - a. **Provide each of the following:**
    - (1) **Library impact statement**  
None
  
    - (2) **Computer impact statement**  
None

**(3) Faculty impact statement**

None

**(4) Facilities impact statement**

None

**b. Provide a statement indicating who will assume financial responsibility for any new resources required:**

There will be no new resources required.

**Sociology & Anthropology**  
**Proposed New Course**

6. **Proposed new course number and course description (as it will appear in course catalogue):**

**SSP 4xx (prefer 452) Organizing, Community and Power (3)**

Seminar on grassroots and national social movement organizing. Seminar discussions will be built around theories of social and political power. Specific topics to be covered include recruitment and media strategies, organizational models, the role of ideology, and movements in the political process. Emphasis will be on practical, applied knowledge of help to practitioners. We will examine examples of both faith-based and race-based organizing, as well as both liberal and conservative social movements

7. **Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

Seminar - 3 hours per week

8. **Rationale for proposed new course:**

Course will bring key insights of political sociology and the study of social movements to our applied sociology students, who currently have no access to graduate level courses in these fields. The course will provide them with important tools they can use upon graduation to conduct community organizing as well as evaluate the mobilization efforts of others on the local and national levels.

9. **Academic impact on programs affected by new course:**      **NO IMPACT**

c. **Is this proposed new course cross listed?** NO

f. **Identify any known effects of the proposed new course on other programs at the University.**

g. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

h. **Identify any known effects of the proposed new course on the University's commitment to diversity.**

10. **Resource Impact Statement:**

c. **Provide each of the following:**

(5)      **Library impact statement**

**Anticipate the need to add 6-10 new books to the library's collection.** Library impact statement for proposed new Graduate course: Organizing Community and Power

Requested by Ziad Munson Sociology and Anthropology Department

Impact statement by Roseann Bowerman Social Sciences Librarian Library and  
Technology Services

November 17 2003

After reviewing the proposed course description and discussing the course with Professor Munson I believe that the library impact of this new course will be minimal. Much of the material on social movements required by this class has been collected in the past as a result of ongoing collection development in Sociology, Political Science and History. Continued collecting in this area will be funded by book funds in those disciplines. Any additional costs for collecting books specific for this course can be absorbed by the library funds budgeted for Sociology. This might entail acquiring materials by and about grass- roots and community organizations and organizers. Professor Munson did not anticipate adding more than a dozen new books in the near future.

No new journal literature will be required and many of the journals that focus on social movements and organizing are indexed and accessible in existing library databases.

It is not anticipated that there will be major costs for new reference works.

**(6) Computer impact statement**

None

**(7) Faculty impact statement**

None

**(8) Facilities impact statement**

None

**d. Provide a statement indicating who will assume financial responsibility for any new resources required:**

Book acquisitions will rely on regular library acquisition budget and departmental request process. (see above).



## Graduate and Research Committee

### Proposed New Course

(Rev. 4/24/01)

1. **Proposed new course number and course description (as it will appear in course catalogue):**

**MACC 401. Professional Issues in Accounting (3)**

This course consists of three modules designed to provide students with an overview of professional accounting topics. The first module introduces business case analysis. Cases will be dissected, analyzed and discussed. A range of business topics will be used to demonstrate the case method. The second module examines the behavioral foundations of the negotiation process. Topics include planning, tactics, power, integrative and distributive bargaining, behavioral styles and individual and team negotiations. The third module examines ethical issues as they relate to business. Through debate and case studies, students will be challenged to determine what are acceptable and ethical business practices, primarily in an international environment, and how these practices relate to the highly diverse elements that comprise today's complex, global enterprises. Open only to MSAIA students.

2. **Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

The instructional mode will be a combination of lectures, team projects, and case studies. The course will be taught during the second summer session over three Friday/Saturday sessions. There will be twelve contact hours in each Friday/Saturday session for a total of 36 contact hours for the course amounting to 2,160 minutes

3. **Rationale for proposed new course:**

The new course replaces MACC 447, Negotiation as a core course in the MSAIA curriculum. From focus groups, observation, and instructors' comments it has become apparent that the MSAIA students need skills in addition to the negotiation skills learned in MACC 447. The new course will be the first master's course encountered by MSAIA students. The new course is designed to provide MSAIA students with the skills they require to be successful in the rest of the Program and in their professional careers.

4. **Academic impact on programs affected by new course:**

a. **Is this proposed new course cross-listed?**

No. However, the course being replaced, MACC 447, is cross-listed as GBUS 447. Since the new course, MACC 401, will include negotiation topics MSAIA students will not be allowed to register for GBUS 447 as an elective

b. **Identify any known effects of the proposed new course on other programs at the University.**  
None.

c. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

(1) **Who was consulted?**

N/A

(2) Is the proposed new course acceptable to all affected programs?

N/A

(3) Will any changes be required in the affected programs? If so, describe.

N/A

d. Identify any known effects of the proposed new course on the University's commitment to diversity.  
N/A

5. Resource Impact Statement:

a. Provide each of the following:

(1) Library impact statement  
The library has good resources for locating financial information on public companies. Examples include Factva CompuStat/Research Insight and Standard & Poor's Market Insight (per Bill Fincke).

(2) Computer impact statement  
None. Any computing requirements will be handled by the Amols Accounting Computer Lab.

(3) Faculty impact statement  
Because the course is being taught in the summer there is no faculty resource impact.

(4) Facilities impact statement  
Will require a classroom as a normal Summer II course.

b. Provide a statement indicating who will assume financial responsibility for any new resources required.

Financial responsibility will be borne by the MSALA Program

**Graduate and Research Committee  
Proposed Course Changes**

1. Current course number and description

MACC 447 Negotiation (3)

A course designed for the graduate student in business examining the behavioral foundation of the negotiation process. These concepts are exposed through both lectures and simulations and include such topics as: planning, tactics, power, integrative and distributive bargaining, behavioral styles and individual and team negotiations. In addition, attention is paid to cross-cultural and individual differences in negotiating style.

2. Description of proposed change

The Accounting department is requesting that the MACC 447 be dropped from the catalog as the course will not longer be taught for MACC students. This course is being replaced by MACC 401 (see previous proposal).

Please note that MACC 447 is cross-listed with GBUS 447, which is to remain. GBUS 447 is not being dropped.

3. Rationale

MACC 447 is being replaced by MACC 401

4. Resource impact statement:

There is no resource impact. The current instructor will continue to teach GBUS 447. It will just not be crosslisted.



November 12 2004

To: College of Business & Economics, P.C. Rossin College of Engineering and the College of Education

From: MBA Core Team

The following course changes were approved at the MBA Core Team Retreat on July 23 2003.

**Change in MBA 401 from 1 credit to 2 credits.**

**Current Description**

MBA 401 – Introduction to the Organization and Its Environment (1 credit)

An MBA Core Course which introduces the entering MBA student to the workings of today's organization and how it impacts and is impacted by its environment. These concepts will be explored using the integrated value chain model and applied through the analysis of a comprehensive case. The course will be offered over a two-day time period at the beginning of each semester.

**Proposed Change**

MBA 401 – Introduction to the Organization and Environment (2 credits)

This MBA Core Course will provide a thorough understanding of business organizations and will clarify ways middle and senior managers can create and sustain organizational competitive advantage. The course examines the organization from an overall perspective within the context of the firm's internal and external environment. The second aspect of this course deals with the ability to communicate effectively in today's business and professional environment. Students will examine and practice the written and verbal communications strategies and skills that are essential to their success in business.

**Description of Proposed Change**

A communications module will be integrated into the strategic management concepts and skills taught in this course. Student assignments for the course will include biweekly writing assignments and weekly team presentations where students will learn methods to adjust for different audiences; use effective presentation structure; improve non-verbal delivery skills; increase the "skim

value' of their documents when appropriate; and to think critically and reflectively about the complex relationship between format, assumptions, content, and context.

### **Rationale**

The MBA Core Team has recognized that many of the students entering the MBA Program do not have effective writing and presentation skills. Since these skills are critical for success in the business environment, the Team decided that the students needed more formal instruction in communications skills.

Addressing this need at the very beginning of the program will allow us to build those skills through our assignments throughout the MBA Core. Students will be graded on writing skill, organization, proper English usage and punctuation as well as style and content in all writing assignments.

### **Effect on the MBA/Engineering and the MBA/Educational Leadership**

The change in MBA 401 to increase the credits from 1 to 2 credits will result in a decrease in from 6 required electives to 5 required electives in the MBA/Engineering and MBA/Educational Leadership programs. It will not effect the overall number of credits required in the program.

### **Change in Cross Core Project and MBA 406**

The Cross Core Project was originally designed to develop our students' cross functional teaming skills. Students were assigned to cross functional teams during the first Spring after they had completed a 4 credit course in the MBA Core. Almost 60% of our students have undergraduate backgrounds in the science and engineering fields, so many of them became the "subject expert" for the concepts learned in the course they had completed. Teams consisted of 5 students each with a different core course background. The Project consisted of a comprehensive analysis of a company chosen by the MBA Core Team. The Project was non-credit but was required for graduation.

Our feedback from students was that they did not like having a project of this magnitude as non-credit. Some students did not take the project seriously because there was no grade assigned and this made managing teams more difficult. Although many students gained knowledge and understanding of how cross functional teams work, many others did not understand the objectives or value of the project. The decision was made to merge the Cross Core Project into MBA 406 when students will have a thorough understanding of the business concepts. Students will still do the project in teams and the MBA Core Team will choose the company used for the project.

## **Current Description**

### **MBA 406 – Integrative Experience (1-4 credits)**

An MBA core course requirement which provides alternative methods for students to apply the body of knowledge acquired in MBA 401 through MBA 405. Students will have the choice of taking a case course, developing and working on a project through their employer or with a corporate partner, an internship or other suitable experiential learning. The preferred option is an outside project rather than a case course. The academic rigor and the time required to complete the project or course will determine the number of credits earned. Prerequisites: MBA 401, MBA 402, MBA 403, MBA 404, MBA 405

## **New Description**

### **MBA 406 – Integrative Experience (3 credits)**

An MBA core course where students apply the body of knowledge acquired in MBA 401 through 405 through a simulation, case presentations and the cross core project. This course places an emphasis on strategic management and takes the point of view of the general manager to view the organization from an overall perspective in the context of the firm's internal and external environment. In doing so, students examine historical perspectives, contemporary theories, and practical applications all in the spirit of helping them develop a broad understanding of strategic management issues and solutions. By combining high-level class discussions, case analyses, a computer simulation competition and the cross-core project, this course exposes students to rigorous theoretical analysis while providing hands-on, simulated real world business experiences. Prerequisites: MBA 401, MBA 402, MBA 403, MBA 404, MBA 405

## **Rationale**

MBA 406 will provide a comprehensive and experiential capstone to the MBA core experience. This course will help us to assess our students' technical knowledge, teaming and leadership skills.

## **Effects on the MBA/Engineering and MBA/Educational Leadership Programs**

The MBA/Educational Leadership Practicum (1 cr.) requirement would remain unchanged. However, the course number would change from MBA 406 to GBUS 496 – Field Studies. The Cross Core Project requirement will be eliminated from the MBA/Educational Leadership program.

The MBA/Engineering does not require MBA 406 so this program will not be affected by the changes. The Cross Core requirement will be eliminated from the MBA & E Program.



**College of Business & Economics  
Graduate and Research Committee**

**Proposed New Certificate Program**

The MBA Core Team has approved the following certificate program and respectfully request that College Policy review and approve the certificate for implementation in Fall 2004.

**Title of New Certificate Program**

Certificate in Organizational Leadership

**Mission Statement**

The purpose of the Certificate in Organizational Leadership is to develop the leadership knowledge, skills and abilities of working professionals to enable them to make better decisions, communicate more effectively, understand and strengthen their personal leadership style, lead their areas or teams in times of crisis and change and enhance their negotiation skills.

**Identify the proposed market and or clients that this program is designed to address**

The Certificate in Organizational Leadership is designed to meet the needs of department heads and other middle managers including technical personnel who want to improve their ability to lead their areas effectively and move into positions of increasing responsibility and decision making. This certificate is not positioned to address strategy-level leadership topics.

**Rationale for the new program**

The Certificate in Organizational Leadership will become part of the CBE's portfolio of certificate programs aimed at developing the skills and abilities of working professionals. Leadership skills are crucial to the success of business managers and the organizations where they work. The coursework in this certificate will broaden our students' perspectives in a wide range of leadership and managerial concepts and applications

**Description of Proposed Program**

**Admissions Criteria**

Students are required to have a four year undergraduate degree from an accredited college or university and at least two years of professional, post baccalaureate work experience. Students currently enrolled in graduate degree

programs at Lehigh and who have the required work experience may enroll without meeting additional requirements.

Students may also enter the program as non-degree students. These applicants must meet the admission criteria set by the CBE for non-degree students. Students must have a minimum of a 3.0 grade point average in their undergraduate degree or have earned a previous masters degree. Other criteria that will be evaluated by the admissions committee include number of years and quality of work experience.

Students may take this program on a non-credit basis. The admissions criteria will include a 4 year undergraduate degree and at least 2 years of professional post-baccalaureate work experience.

### **Program Requirements (12 credits)**

#### **Required Courses (6 credits)**

GBUS 447 – Negotiation (3 credits)

GBUS 459 – Survey of Project Management (3 credits)

#### **Electives (6 credits)**

Students will complete their program by taking multiple offerings of GBUS 492 – Special Topics under different topic subtitles. Some sample topics for GBUS 492 include (but are not limited to):

- Crisis Management and Communication (1 credit)
- Effective Team Leadership (1 credit)
- Ethical Decision Making (1 credit)
- Leadership Styles and Assessment (1 credit)
- Translating Vision into Strategy (1 credit)
- Cross Cultural Communication (1 credit)
- Change Management (1 credit)
- Leadership Skills Assessment and Development (1 credit)

### **Course Descriptions**

#### **GBUS 447 – Negotiation (3 credits) Existing Course**

The class examines the behavioral foundations of the negotiation process. Topics include the negotiation process, negotiation planning, power in negotiations, communications in negotiations, tactics, concepts of win-win and win-lose, social styles, individual and team negotiations, ethical considerations, cultural differences negotiating in sole source (customer) situations, using third parties. The concepts will be exposed through both lectures and simulations

**GBUS 459 – Survey of Project Management (3 credits) Existing course**

Provides an overview of the project management framework and knowledge areas. It deals with the day-to-day, hands-on problems of managing a project (defined as a temporary structure within a permanent organization, set up to achieve a specific objective). Areas covered will include: project integration project scope, project planning and implementation, project control and evaluation, project cost and risk management, project resource management and organization, and project communication. Cases are used to illustrate problems and techniques to solve them. Students use a project management tool during this course.

**Academic Impact Statement:**

- a. **Is the proposed new program interdisciplinary? If yes, identify the programs and or departments involved.**

The program is not interdisciplinary.

- b. **Identify any known effects of the proposed new program on other programs at the University.**

No known effects on other programs at the University

- c. **If there are known effects, individuals in charge of the affected programs must be consulted about the proposed new program and the following information provided.**

N/A

- d. **Identify any known effects of the proposed new program on the University's commitment to diversity**

The cross-cultural communications course promotes diversity in the workplace and provides the knowledge and skills to increase the effectiveness of communications in a diverse working environment.

**Resource Impact Statement:**

- a. **Library impact statement**

No impact is anticipated on library resources

- b. **Computer impact statement**

Several of the courses in the certificate program are offered on-line. The development of additional modules will require the use of LTS instructional designers and administrative services of the Office of

Distance Education. In addition, some students may prefer to do assignments on-campus using university facilities. However the overall increase in the use of on-campus facilities will be limited due to the intended audience for this program. Most of the students will be part-time professionals with computer resources available to them at work and in their homes.

**c. Faculty impact statement**

Several of the courses listed are currently taught and are used for other programs including the Supply Chain Management Certificate and the MBA Program. The Certificate in Leadership Development will not require new sections of these courses. Negotiation and Project Management Essentials are currently offered both on-campus and on-line. Effective Team Leadership and Leadership Styles and Assessment are also taught on-campus on a regular basis. Ethical Decision Making Crisis Management and Communications are already scheduled as summer 2004 courses. Translating Vision into Strategy is scheduled for Fall 2004 within the regular teaching load. Adjunct faculty will be used for the Cross Cultural Communications and Change Management courses.

**d. Facilities Impact Statement**

Since several of the courses are already being taught as a part of other programs and the others will use our professional education classrooms here should not be any impact on the current facilities.

**Provide a statement indicating who will assume financial responsibility for any new resources required:**

Financial responsibility for the certificate program will be borne by the College of Business & Economics.

## Proposed Course Changes

### Educational Technology Program & Technology-based Teacher Education Program

Department of Education and Human Services, College of Education

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#### Proposed:

1. Change EdT/TBTE 401 & EdT/TBTE 402 to separately listed courses with different academic program prefixes (EdT and TBTE) and new course numbers
  2. Change title, and description for EdT 401 and TBTE 401; change course number for TBTE 401
  3. Drop EdT 402 and add 3 hours of elective to both the MS in Educational Technology and MS in Instructional Design and Development degrees.
  4. Change course number, title and description for TBTE 402.
- 
- 

#### Sever Cross-Listing, Change Course NumTitle and Description:

##### 1. Current course number and course description (from course catalogue):

**EdT /TBTE 401. Technology-Based Teaching and Learning 1: Foundations and Issues (3)**  
Historical, philosophical, psychological, and curricular foundations of teaching and learning with technology. All students will acquire technical skills for use in this and subsequence courses. (Must be taken in sequence with EdT 402 Technology-based Teaching and Learning 2: Methods & Assessment).

##### 2. Proposed course number and course description (as it will appear in course catalogue):

**EdT 401. Foundations of Educational Technology (3)**  
History and overview of the field with consideration of key learning theories and principles that guide designers and developers. Identification of prominent figures and organizations, key issues and terms, and useful resources in the field. Consideration of forces affecting adoption of innovation with a focus on future directions in teaching and learning with technology.

##### **TBTE 406. Tools for K-12 Teaching and Learning (3)**

Application of technology in school-based instructional settings. This course addresses the use of technology tools and resources to enhance and manage learning. Students will demonstrate skills in design and development of Web sites, evaluation and use of educational software, production and integration of digital media, and other key competencies.

##### 3. Description of proposed change(s):

- Change EdT/TBTE 401 from cross-listed course to two separate courses with different program prefixes.
- Change title and course description for EdT 401
- Change course number, title, and course description for TBTE 401.

##### 4. Rationale for proposed change(s):

This was a cross-listed course between the Educational Technology (EdT) and Technology-based Teacher Education (TBTE) programs, required of all masters students in both programs. Goals for creating these cross-listed courses included encouraging the two programs to collaborate in producing and sharing resources, to encourage transfer of technology skills across faculties, and to collaborate on course design. In these ways, the initiative was a success. After six semesters of joint offerings, some co-taught and all

sections having students from both programs, it has become clear, however, that the demands of the Technology-based Teacher Education degree programs and the Educational Technology degree programs differ in some significant ways, particularly in light of Pennsylvania Department of Education teacher certification requirements. For this reason, we are terminating cross-offering and reconstituting each course to suit the differential needs of students in the two programs.

The existing description was better suited to the cross-offered (EdT and TBTE) course that needed to have a more generic, cross-program focus. With the restoration of separate program-specific courses that are no longer cross-listed, each course can cover more content in greater depth and focus more on the needs of students in each individual program. The proposed new titles and descriptions were derived from all-day curriculum redesign retreats held by the two programs' (EdT and TBTE) faculty

We propose to change the TBTE course number because using the same course numbers with these new descriptions could lead to confusion, particularly for those fulfilling the current TBTE 401-402 required sequence. Those who have taken EdT/TBTE 401 would now take TBTE 406 to complete the two-course sequence.

**5. Resource Impact Statement:**

On faculty:	None
On library & technology resources:	None. Uses existing library and technology resources.
On academic programs:	TBTE and EdT separately approved change. Has no effect on TBTE masters. Does not change total number of credits in the any EdT degree program nor any degree programs in TBTE.

**Sever Cross-Listing; Drop 1 course, Change Number, Title, and Description for Other:**

**1. Current course number and course description (from course catalogue):**

**EdT/TBTE 402. Technology-Based Teaching and Learning 2: Methods and Assessment (3)**

Second course in a two-course sequence, this course explores ways to determine the effectiveness of technology-based teaching and learning methods and products. Emphasis on identifying best practices in the use of technology. Has a strong research component. (Must be taken in sequence with EdT/TBTE 401 Technology-based Teaching and Learning 1: Foundations & Issues).

**2. Proposed course number and course description (as it will appear in course catalogue):**

**TBTE 407. Designing for K-12 Teaching and Learning (3)**

Theoretical, philosophical and curricular foundations of instruction. This course explores theories of learning and their application, implications for the use of technology, and standards-based education. Special emphasis on planning, developing and assessing instruction. Prerequisite: Successful prior completion of TBTE 406.

**3. Description of proposed change(s):**

- Change EdI/IBIE 402 from cross-listed course to two separate courses with different program prefixes.
- Drop EdI 402
- Change course number, title and course description for TBTE 402.

**4. Rationale for proposed change:**

This was the second in the pair of cross-listed course required of all masters students in both EdI and IBIE. While Technology-based Teacher Education will retain a modified (and renumbered) version of both TBTE 401 and 402, students in Educational Technology do not need two courses, in addition to a required research methods course (which is not currently required of students in TBTE degree programs and which shares substantial content with the current EdT/IBIE 402 course). Educational Technology, therefore, is changing the content covered in EdT 401 to make it better suited to the needs of its students and dropping the EdT 402 requirement in favor of adding another elective to the MS degree (see yellow highlights on next two pages).

We propose to change the IBIE course number because using the same course numbers with these new descriptions could lead to confusion. The new two-course sequence becomes TBTE 406-407.

**5. Resource Impact Statement:**

On faculty:	None. Actually reduces pressure on faculty load.
On library & technology resources:	None. Uses existing library and technology resources
On academic programs:	TBTE and EdT separately approved change. Has no effect on TBTE masters. Adds elective to both EdT masters programs without changing total number of required credits (see yellow highlighted program listing below). Has no effect on TBTE degree program requirements

## Masters of Science (M.S.) Degree in Educational Technology

(30 credit hour minimum)

<Initially aimed at Students in International Program>

Type of Requirement	Course	Hours
<b>College</b>		<b>6 hours</b>
	Educ 403. Research	3
	Educ 471. Multicultural Issues	3
<b>Foundations</b>		<b>3 hours</b>
	EdT 401. Foundations of Educational Technology or TBLE 402. Designing for K-12 Teaching and Learning	3
<b>Technology-based Content Delivery</b>		<b>3 hours</b>
	EdT 405. Website and Resource Development	3
<b>Design Skills</b>		<b>6 hours</b>
	EdT 443. Principles of Interface Design	3
	EdT 433. Instructional Design	3
<b>Technology Implementation</b>		<b>6 hours</b>
	EdT 470. Technology Across the Curriculum	3
	EdT 471. Planning for Implementing Technology in School Settings	3
<b>Advanced Work</b>		<b>6 hours</b>
	Educ 491,492. Advanced Seminar in Educational Technology (topic changes)	1-6
	Educ 477. Research Topics in Educational Technology (topic changes)	3
	Electives as approved by program coordinator	1-6

**Requirements for the Masters of Science in Instructional Design and Development  
Educational Technology Program, College of Education, Lehigh University**

This 30-hour (minimum) masters of science program requires the student to take 24 hours in 3 clusters (as shown below)

Once a student has completed these 24 hours, he or she completes the program by taking 6 additional hours. These 6 hours may come from additional courses in the 3 technology core areas, from electives focusing on key issues and skills or from internships, fieldwork, or independent studies intended to enrich the student's portfolio.

The expectation is that students in the program are actively seeking to become designers or developers of technology-based teaching/learning materials and will work to make the transition in competence from "student" to "professional" as quickly as possible. This means students will be expected to work on projects throughout their program and will work outside class settings to maintain and enhance their skills.

**Technology Core (15 hours)**

Strand	Advanced Course
Foundations	EdT 401. Foundations of Educational Technology (3)
Instructional Design/ Interface Design	EdT 433. Instructional Design (3) – In-depth exploration of instructional design models and philosophies and their implications for teaching and learning using technology EdT 443. Principles of Interface Design (3) – Designing interfaces with a focus on effectiveness and ease of use.
Programming	EdT 404. Multimedia Programming for Instruction (3) – Introduction to programming for both Web-based and standalone learning materials.
Web Creation/ Resource Development	EdT 405. Website and Digital Resource Development (3) -- Introduction to commercial HTML editors to create resource-rich eLearning sites. Special emphasis on resource-development skills and tools.

**College Core (6 hours)**

Educ 403. Research Methods (3)  
Educ 471. Multicultural Issues (3)

**Advanced Study in Technology (3-12 hours)** — With guidance from advisor student should take at least one advanced course in one of the 3 strands.

Strand	Advanced Course
Instructional Design/ Interface Design	EdT 453. Advanced Instructional Design (3) – Exploration of newer models for teaching and learning, with a focus on designing materials for distributed learning.
Programming	EdT 406. Advanced Multimedia Programming (3) – Advanced programming for Web-based and standalone educational applications.
Web Creation/ Resource Development	EdT 407. Advanced Web and Digital Resource Development (3) -- Advanced Website creation and use of digital resource-development software to create highly interactive eLearning sites. Topics include streaming media development and broadcasting.

**Electives/Portfolio Development (0-9 hours)**

With guidance from advisor, student may take related electives or work to expand his/her portfolio.

Educ 493. Internship in Educational Technology (3)  
Educ 494. Fieldwork in Educational Technology (3)  
Educ 495. Independent Study in Educational Technology (1-6)  
Educ 477. Research Topics in Educational Technology (3)  
EdT 478. Applied Research in Educational Technology (4)  
Educ 491, 492. Advanced Seminars (special topics in educational technology) (1-E)  
Other EdT courses as appropriate; Other non-EdT courses as appropriate

**Total Hours (minimum): 30**



# Proposed Course Changes

## Educational Technology Program Department of Education and Human Services, College of Education

### SUMMARY OF PROPOSED CHANGES

#### Summary of Requested Actions:

1. Change course numbering for numerous courses to clean up sequence and make numbering logical.
2. Drop courses EdT 406, EdT 418, EdT 420 Drop EdT 428 and reuse its number.
3. Change titles and descriptions for EdT 404, EdT 405, EdT 407, EdT 443, EdI 453, EdI 455, EdT 458.
4. Change credit hours for EdI 477 (new number EdI 415) and make repeatable for credit under different subtitles.
5. Make EdT 455 (new course number 408) repeatable for credit under different subtitle.
6. Revise Instructional Design and Development (ID&D) and Educational Technology masters programs' requirements to match changes above.

#### Summary Table for Course Changes:

Present Course	Becomes
EdT 404. Interactive Multimedia Programming (3)	EdT 435. Development II: Interactive Multimedia Programming for Learning (3).
EdT 405. Website & Resource Development (3)	EdT 432. Development I: Website & Resource Development for Learning (3)
EdT 407. Advanced Website & Resource Development (3)	EdT 438. Development III: Advanced Development of Instructional Resources and Technologies: [subtitle] (3) May be repeated for credit under different subtitle.
EdT 433. Instructional Design (3)	EdT 422. Design I: The Systematic Design of Instruction (3)
EdT 443. Principles of Interface Design (3)	EdT 425. Design II: Applied Instructional and Interface Design Principles (3)
EdT 428. Advanced Interactive Computing & Telecommunications (3)	EdT 428. Design III: Advanced Instructional Design (3)
EdT 453. Advanced Instructional Design (3)	
EdT 455 Vygotsky's Theories Applied to Educational Technology (3)	EdT 408. Advanced Learning Theories Applied to Educational Technology: [subtitle] (3) May be repeated for credit under different subtitle.
EdT 458. Integrating Experience in Educational Technology (3)	EdT 490. Integrating Experience in Instructional Design and Development (3)
EdT 477. Research Topics in Educational Technology [subtitle] (3)	EdT 415 Topics in Educational Technology [subtitle] (1.5) May be repeated for credit under different subtitle.
EdT 478. Applied Research in Educational Technology (4)	EdT 485. Applied Research in Educational Technology (3).
New course	EdT 482 Critical Reading and Writing in Educational Technology (3)

**Rationale for Proposed Changes:****Tighter integration.**

These modifications unify Educational Technology coursework by moving coverage of topic and skills so that there is a more logical instructional sequence. This kind of integration required that the program faculty modify almost all titles and descriptions of courses in the program. These changes represent systemic programmatic integration.

**Reorganization, retitling, and renumbering.**

These changes represent reorganization of courses, as well as renumbering to make their linear order clearer to students. Courses are retitled to make their relationships to one another clearer.

**Culminating experience.**

In recent years, a much greater proportion of our masters student have been participating in internships and field experiences, often for pay. The program faculty feels that it is important for these students to be well prepared for professional experience. For this reason, we propose adding a requirement that all ID&D masters students participate in a culminating experience.

**General Resource Impact Statements (apply to all proposed changes):**

On faculty:	None.
On library & technology:	None. Uses existing library and technology resources, as well as existing facilities.
On academic programs:	<p>EdI faculty approved changes. (The proposed changes are the result of an all-day curriculum redesign retreat held by the Educational Technology program faculty.)</p> <ol style="list-style-type: none"> <li>1. Does not change total number of credits in EdI Instructional Design and Development (ID&amp;D) masters (M.S.) degree program. <ul style="list-style-type: none"> <li>• Students in the existing ID&amp;D program would be allowed to count newly numbered and titled courses for existing requirements. Similarly, students in the existing ID&amp;D program can choose whether they wish to take the culminating experience that will be required under the new program. That is, they may elect to complete their present degrees under its present requirements without adding a culminating experience.</li> </ul> </li> <li>2. Does not affect the total number of credits in the EdI Educational Technology masters degree program. <ul style="list-style-type: none"> <li>• This degree program is aimed at teachers, administrators, and staff in International schools worldwide. No students have yet been admitted to pursue this degree, so the changes shown would not affect any current students.</li> </ul> </li> <li>3. Does not affect the total number of credits in the EdI Educational Technology doctoral program. <ul style="list-style-type: none"> <li>• Students currently in the EdI doctoral program would be allowed to count newly numbered and titled courses for existing requirements. This has no effect on course distributions or requirements.</li> </ul> </li> </ol>

## DETAILS ON PROPOSED CHANGES

### New Course

**1. Proposed new course number and course description (as it will appear in course catalogue):**

**EdI 482. Critical Reading and Writing in Educational Technology (3)**

Using literature to build persuasive written arguments. Searching and identifying promising sources, distilling research findings, synthesizing literature to support an argument, and organizing written materials to enhance persuasiveness. Suited to those writing qualifying projects, dissertation proposals, dissertations, funding proposals, conference proposals, and journal articles. Prerequisite Educ 403.

**Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

Lecture, discussion, online activities; 3 contact hours per week (or equivalent)

**2. Rationale for proposed new course:**

Critical Reading and Writing in Educational Technology has been offered twice as an Educ 491 Advanced Seminar and needs to be formally added to the curriculum. We see this course as being of great value to our students, particularly those in the doctoral program.

**3. Academic impact on programs affected by new course:**

a. **Is this proposed new course cross listed?** No

b. **Identify any known effects of the proposed new course on other programs at the University.**

Currently both Educational Technology (EdI) and Technology-based Teacher Education (TBTE) have proposed concentrations in the proposed LSI doctoral program. Doctoral students in that doctoral program may wish to take this course.

c. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

(1) **Who was consulted?** All faculty in both programs (EdT and TBTE) were consulted.

(2) **Is the proposed new course acceptable to all affected programs?** Yes

(3) **Will any changes be required in the affected programs? If so, describe.** No.

d. **Identify any known effects of the proposed new course on the University's commitment to diversity.** No known effects.

**4. Resource Impact Statement:**

a. **Provide each of the following:**

(1) **Library impact statement** None.

(2) **Computer impact statement** None. Uses existing technology resources.

(3) **Faculty impact statement** Likely to be offered in alternating years. No impact on faculty load.

(4) **Facilities impact statement** None. This course does not require any additional facilities

b. **Provide a statement indicating who will assume financial responsibility for any new resources required:** None needed

## **Course Renumbering**

### **Proposed changes:**

Renumber Educational Technology courses so that they fall into ranges that identify the type of content they cover and make clearer intended course sequences.

New course numbering scheme—

- EdT 400-409= Foundations/Underlying Theory
- EdI 410-419= Topic Explorations
- EdI 420-429= Design
- EdI 430-439= Development
- EdI 440-449= Open
- EdI 450-459= Open
- EdI 460-469= Open
- EdI 470-479= Implementation of Technology in Schools
- EdI 480-489= Research Methods and Applications
- EdI 490-499= Independent and Culminating Experiences

### **Rationale for making the proposed changes:**

Over the years, adding, dropping, and replacing courses has led to anomalies in course numbering. In addition, the need to avoid reusing course numbers within five years of their last prior use created its own set of problems. Lastly, recent changes in program faculty have led to a much higher level of collaboration than has ever existed previously, making it possible to make this change with the consent of all program faculty

## **Drop Courses/Reuse Course Number**

### **Proposed changes:**

1. Drop EdI 406. Advanced Multimedia Programming (3)
2. Drop EdI 418. Desktop Publishing (3)
3. Drop EdI 420. Media Production for Instructional Programming (3)
4. Reuse course number of EdT 428. Advanced Interactive Computing and Telecommunications

### **Rationale for making the proposed changes:**

- EdI 418 is no longer offered and has not been offered for years.
- EdI 420 has not been offered in years and its content is incorporated in the new Development I - III sequence.
- The new Development I - III course sequence (EdI 432-438) eliminates the need for EdI 406.
- EdI 428 was taught by a faculty who has since retired. It has not been taught in many years. Its number is needed for another course in order to comply with the renumbering scheme.

### Change Course Numbers, Titles, and Descriptions

**1. Current course number and course description (from course catalogue):**

**EdT 404. Interactive Multimedia Programming (3)**

Introduction to programming interactive multimedia applications in education and training. Emphasis on creating applications utilizing sound, video, graphics and other digital resources.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**EdT 435. Development II: Interactive Multimedia Programming for Learning (3)**

Introduction to creating educational applications utilizing sound, video, graphics and other digital resources. Prerequisite: EdT 432.

**3. Description of proposed change(s):**

- Change course number to EdT 435 so that it numerically falls after EdT 432 (see below) and reflects the logical course sequence.
- Change course title to indicate more clearly the course's instructional focus and that it is the second in the series of development courses.
- Change course description to reflect slight change in focus and list prerequisite

**4. Rationale for proposed change(s):** See above.

**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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**1. Current course number, title and description (from course catalogue):**

**EdT 405. Website and Resource Development (3)**

Introduction to resource development and HTML editing tools used in the creation of eLearning Websites. Covers fundamentals of: HTML and commercial Web-creation software packages; scanners and digital video cameras; and use of digital resource creation-and-manipulation programs

**2. Proposed course number, title, and description (as it will appear in course catalogue):**

**EdT 432. Development I: Website and Resource Development for Learning (3)**

Introduction to resource development and HTML editing tools used in the creation of eLearning Websites. Covers fundamentals of: HTML and commercial Web-creation software packages; scanners and digital video cameras; and use of digital resource creation-and-manipulation programs. No prerequisites.

**3. Description of proposed change(s):**

- Change course number to EdT 432 to make clearer it is at the beginning of the development course sequence.
- Change course title to indicate more clearly the course's instructional focus and that it is the first in the series of development courses.
- Add "no prerequisites" to make clear this is an entry point for the development course sequence.

**4. Rationale for proposed change(s):** See above

**5. Resource Impact Statement:** No impact on library, faculty, technology or facilities.

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**1. Current course number and course description (from course catalogue):**

**EdI 407. Advanced Website and Resource Development (3)**

Focus on using more sophisticated Website and digital resource development-and-manipulation tools to create multimedia learning materials. Prerequisite: EdI 405 or consent of instructor

**2. Proposed course number and course description (as it will appear in course catalogue):**

**EdI 438. Development III: Advanced Development of Instructional Resources and Technologies: (Subtitle) (3)**

Focus on using more sophisticated Website and digital resource development-and-manipulation tools to create multimedia learning materials. Topics will vary (for example, Database-Driven Web Development; Assistive Devices for Special Populations; Programming Hand-held Devices; Audio Resource Development; Media Production for Instructional Programming). Prerequisite: EdI 435. May be repeated for credit under different subtitle.

**3. Description of proposed change(s):**

- Change course number to EdI 438 so that it falls after EdI 432 and EdI 435 and reflects the logical course sequence.
- Change course title to indicate more clearly that it is the third in the series of development courses.
- Change course description to indicate that this will be a "topics" course and allow for offering under different subtitle as part of covering different development approaches/issues and new technologies as they arise.

**4. Rationale for proposed change(s):** See above.

**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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**1. Current course number and course description (from course catalogue):**

**EdI 433. Instructional Design (3)**

In-depth exploration of instructional design models and philosophies and their implications for teaching and learning using technology. Systematic application of design approaches and procedures used in education and industry.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**EdI 422. Design I: The Systematic Design of Instruction (3)**

Introductory exploration of instructional design models and philosophies and their implications for teaching and learning using technology. Heavy focus on instructional message design. Applies perception theory, communication theory, and learning theory to the design of instructional media. Students in this course design instructional materials employing the theories and guidelines explored. Pre/co-requisite: EdI 401.

**3. Description of proposed change(s):**

- Change course number to EdI 422 so that it is the first course in the design series.
- Change course title to indicate more clearly that it is the first in the series of design courses.
- Change description to indicate shift in focus to instructional message design and to add pre/co-requisite.

**4. Rationale for proposed change(s):** See above

**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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1. **Current course number and course description (from course catalogue):**

**EdT 443. Principles of Interface Design (3)**

Design principles applied to the creation of technology-based interfaces. Special emphasis on graphical user interfaces in education and training, although concepts covered apply to all interfaces.

2. **Proposed course number and course description (as it will appear in course catalogue):**

**EdT 425. Design II: Applied Instructional and Interface Design Principles (3)**

Exploration and application of design models for learning. Special emphasis on graphical user interfaces in education and training. Prerequisite: EdT 422

3. **Description of proposed change(s):**

- Change course number to EdT 425 to reflect more clearly that it is the second course in the design sequence of courses.
- Change course title to indicate more clearly that it is the second in the series of design courses.
- Change description to add prerequisite and broaden course focus.

4. **Rationale for proposed change(s):** See above

5. **Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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1. **Current course number and course description (from course catalogue):**

**EdI 428. Advanced Interactive Computing and Telecommunications (4)**

Integration of object-oriented programming and emerging telecommunication networks for interactive distributed learning. Conceptual orientation, policy issues, and emphasizing interactive instruction and training delivered over enterprise and wide area networks. Special attention to the construction of applications for satellite delivery, the Internet, and desktop-conferencing systems. Prerequisite: EdT 404 or consent of instructor.

**EdI 453. Advanced Instructional Design (3)**

Advanced instructional design and interface issues. Design of instructional environments, selection of instructional metaphors, impact of the interface on the user, and demands of designing for newer learning technologies. Prerequisite: EdT 433 or consent of instructor.

2. **Proposed course number and course description (as it will appear in course catalogue):**

**EdT 428. Design III: Advanced Instructional Design (3)**

Advanced instructional design and interface issues. Design of instructional environments, selection of instructional metaphors, impact of the interface on the user, and demands of designing for newer learning technologies. Prerequisite: EdT 425

3. **Description of proposed change(s):**

- Change course number to EdT 428 to reflect more clearly that it is the final course in the design sequence of courses.
- Change course title to indicate more clearly that it is the third in the series of design courses.
- Change description to add EdT 422 and EdI 425 prerequisites and drop instructor consent.

4. **Rationale for proposed change(s):** See above.

5. **Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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**1. Current course number and course description (from course catalogue):**

**EdT 455. Vygotsky's Theories Applied to Educational Technology (3)**

Advanced seminar examining historical and theoretical issues related to Vygotsky's theories of socio-historical psychology. Vygotsky's theories applied specifically to the design and use of technology-based instructional materials.

**2. Proposed course number and course description (as it will appear in course catalogue):**

**EdT 408. Advanced Learning Theories Applied to Educational Technology [subtitle] (3)**

Advanced seminar examining theories of socio-historical psychology and their application to educational technology. Topics vary: for example, Vygotsky's Theories Applied to Educational Technology, Communication Theories Applied to Educational Technologies, Group Dynamics Theories Applied to Educational Technologies. Prerequisite: EdT 401. May be repeated for credit under different topic.

**3. Description of proposed change(s):**

- Change course number to EdT 408 to make clearer that it belongs to the foundational/theory series of courses.
- Change course title to be more general
- Change course description to be more general and to indicate that this will be a 'topics' course

**4. Rationale for proposed change(s):** See above

**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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**1. Current course number and course description (from course catalogue):**

**EdT 458. Integrating Experience in Educational Technology (3-8)**

Pursuit of independent topics of interest through directed research, participation in internal or external project work or internships, or development of portfolio materials. Individual or team work under the direction of a faculty member. May be repeated for up to 8 hours of credit. Prerequisites: Educ 403, EdT 404, EdT 405, EdT 407, and EdT 433

**2. Proposed course number and course description (as it will appear in course catalogue):**

**EdT 490. Integrating Experience in Instructional Design and Development (3)**

Project-based design and development. Students work in teams to design and develop internal or external instructional technology projects under the direction of a faculty member. Prerequisites: EdT 425 and EdT 435.

**3. Description of proposed change(s):**

- Change course number to EdT 490 to make clearer that it's in the culminating experiences/independent study category of courses (along with Educ 493. Internship, Educ 494. Fieldwork, and Educ 495. Independent Study).
- Change course title to indicate more clearly the instructional design and development focus of this experience.
- Change the description to more accurately reflect the course's focus and new prerequisites.

**4. Rationale for proposed change(s):** See above.

**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

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**1. Current course number and course description (from course catalogue):****EdT 477. Research Topics in Educational Technology (3)**

Current issues and practices related to the use or adoption of educational technology. Topics will vary (for example, The Role of Educational Technology in Teaching Persons with Special Needs; Educational Technology in the Workplace; Educational Technology and School Restructuring). May be repeated for credit as topic varies

**2. Proposed course number and course description (as it will appear in course catalogue):****EdT 415. Topics in Educational Technology: (Subtitle) (1.5)**

Current issues and practices related to the use or adoption of educational technology. Topics will vary (for example, The Role of Educational Technology in Teaching Persons with Special Needs; Educational Technology in the Workplace; Educational Technology and School Restructuring). May be repeated for credit as topic varies

**3. Description of proposed change(s):**

- Change course number to EdT 415 to place it in the range for topic explorations.
- Change course credit to reflect shorter duration with more frequent offering.

**4. Rationale for proposed change(s):** Changing this course from 3 credits to 1.5 doubles the frequency with which we can offer it, while maintaining the same faculty load. It also permits us to address more highly focused issues. This increases program flexibility and exposes our masters and doctoral students to a wider variety of content than we have been able to do in the past.**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities**1. Current course number and course description (from course catalogue):****EdT 478. Applied Research in Educational Technology (4)**

Approaches and techniques applicable to empirical research studies in educational technology, both quantitative and qualitative. Students design and carry out small-scale investigations of research questions and hypotheses related to educational technology and write up research reports of their findings and conclusions. Prerequisite: Educ 403.

**2. Proposed course number and course description (as it will appear in course catalogue):****EdT 485. Applied Research in Educational Technology (3).**

Approaches and techniques applicable to empirical research studies in educational technology, both quantitative and qualitative. Students design and carry out small-scale investigations of research questions and hypotheses related to educational technology and write up research reports of their findings and conclusions. Prerequisites: EdT 425 plus either Educ 403.

**3. Description of proposed change(s):**

- Change course number to EdT 485 to place in proper number range for research courses
- Change course credit to 3 instead of 4.
- Change prerequisites to include EdT 425 course as well as Educ 403.

**4. Rationale for proposed change(s):** See above. Change in credits is also to make the course fit faculty load assignments better and to reflect changed expectations for what learners in this course will accomplish.**5. Resource Impact Statement:** No impact on library, faculty, technology, or facilities.

**Effects on Degree Program Requirements and Listings**

- The next page illustrates how the only change to the Educational Technology masters degree for International students is in course numberings.
- The page after that illustrates how the course changes described above would be incorporated in the Instructional Design and Development M.S. degree
- As noted earlier, the only changes in the present EdT doctoral program would be to change course numberings.

## Masters of Science (M.S.) Degree in Educational Technology (30 credit hour minimum)

<Initially aimed at Students in International Program>

Type of Requirement	Course	Hours
<b>College</b>		<b>6 hours</b>
	Educ 403. Research	3
	Educ 471. Multicultural Issues	3
<b>Foundations</b>		<b>3 hours</b>
	EdT 401. Foundations of Educational Technology	3
<b>Technology-based Content Delivery</b>		<b>3 hours</b>
	EdT 432. Development I: Website and Resource Development for Learning	3
<b>Design Skills</b>		<b>6 hours</b>
	EdT 422. Design I: The Systematic Design of Instruction	3
	EdT 425. Design II: Applied Instructional and Interface Design Principles	3
<b>Technology Implementation</b>		<b>6 hours</b>
	EdT 470. Technology Across the Curriculum	3
	EdT 471. Planning for Implementing Technology in School Settings	3
<b>Advanced Work</b>		<b>6 hours</b>
	Educ 491,492. Advanced Seminar in Educational Technology (topic changes)	1-6
	EdT 415. Topics in Educational Technology (topic changes)	1.5
	Electives as approved by program coordinator	1-6

### Requirements for the Masters of Science in Instructional Design and Development Educational Technology Program, College of Education, Lehigh University

This 30-hour (minimum) masters of science program in educational technology requires the student to take 15 hours in the Technology Core and 6 hours in the College Core.

Once a student has completed these 21 hours, he or she completes the program by taking at least 9 additional hours. Three of these hours will come from the Advanced Study in Instructional Design and Development area and 3 hours will come from an "integrating experience" in the field. The remaining 3 hours may come from additional courses in the Advanced Study in Instructional Design and Development area, from electives focusing on key issues and skills, or from independent studies intended to enrich the student's portfolio.

The expectation is that students in the program are actively seeking to become designers or developers of technology-based teaching/learning materials and will work to make the transition in competence from "student" to "professional" as quickly as possible. This means students will be expected to work on projects throughout their program and will work outside class settings to maintain and enhance their skills.

#### Technology Core (15 hours)

Strand	Course
Foundations	EdT 401. Foundations of Educational Technology (3)
Instructional Design	EdT 422. Design I: The Systematic Design of Instruction (3) — Introductory exploration of instructional design models and philosophies and their implications for teaching and learning using technology.
	EdT 425. Design II: Applied Instructional and Interface Design Principles (3) — Exploration and application of design models for learning.
Development of Instructional Technologies	EdT 432. Development I: Website and Resource Development for Learning (3) — Introduction to resource development and HTML editing tools used in the creation of eLearning Websites
	EdT 435. Development II: Interactive Multimedia Programming for Learning (3) — Introduction to creating educational applications utilizing sound, video, graphics and other digital resources.

#### College Core (6 hours)

- Educ 403. Research (3)
- Educ 471. Diversity and Multicultural Issues (3)

**Advanced Study in Instructional Design and Development (3-6 hours)** — With guidance from advisor, student should take at least one of the three advanced courses listed below.

Strand	Advanced Course
Foundations	EdT 408. Advanced Learning Theories Applied to Educational Technology (3) — Advanced seminar examining theories of socio-historical psychology and their application to educational technology.
Instructional Design	EdT 428. Design III: Advanced Instructional Design (3) — Advanced instructional design and interface issues
Development of Instructional Technologies	EdT 438. Development III. Advanced Development of Instructional Resources and Technologies: (Subtitle) (3) — Focus on using more sophisticated Website and digital resource development-and-manipulation tools to create multimedia learning materials. May be repeated for credit under different subtitle

**Integrating Experience (3-6 hours)** — With guidance from advisor, student should take at least one of the culminating experience opportunities listed below.

- EdT 490. Integrating Experience in Instructional Design and Development (3) — Project-based design and development
- Educ 493. Internship in Educational Technology (3)
- Educ 494. Fieldwork in Educational Technology (3)

**Electives/Portfolio Development (0-3 hours)** — With guidance from advisor, student may take related electives or work to expand his/her portfolio.

- Educ 495. Independent Study in Educational Technology (1-6)
- EdT 477. Topics in Educational Technology (1.5) [May be repeated for credit under different subtitle.]
- EdT 485. Applied Research in Educational Technology (3)
- Educ 491, 492. Advanced Seminars (special topics in educational technology) (1-6)
- Other EdT courses as appropriate; Other non-EdT courses as appropriate

**Total Hours (minimum): 30**

Summary of Changes Brought Forward to GRC by Curriculum Subcommittee  
March 16, 2004

Part 1 of 2

**Rossin College of Engineering and Applied Science**

**New APA Course:**

- CSE 445 WWW Search Engines

Requested subcommittee changes: NONE.  
Recommendation to GRC: Approve

**Course title and description change:**

- ME442 (ChE461, Engr 452). Mathematical Methods in Engineering

Requested subcommittee changes: NONE.  
Recommendation to GRC: Approve

**6 new courses:**

- ECE 446. RF Power Amplifiers for Wireless Communications
- ECE445 Fundamentals of Wireless Communications
- ECE 458 Quantum Electronics
- ECE 449 Semiconductor Lasers I
- ECE 459 Semiconductor Lasers II
- ECE 438 Turbo Codes and Iterative

Requested subcommittee changes: One minor description error. Correction made.  
Recommendation to GRC: Approve all

**New MS Degree:**

- Wireless and Networking Engineering

Requested subcommittee changes: Subcommittee requested minor modifications and corrections. These were made.

Recommendation to GRC: Approve

**New Graduate Certificate Program:**

- Nanomaterials

Requested subcommittee changes: Requested clarifications/revisions to meet grad certificate requirements. These were made.

Recommendation to GRC: Approve



**Graduate and Research Committee**  
**Proposed New Course**

1. **Proposed new course number and course description (as it will appear in course catalogue):**

**IE 441. Financial Engineering Projects (3)**

Analysis, design and implementation of solutions to problems in financial services using information technology, mathematical modeling, and other financial engineering techniques. Emphasis on real-world problem solving, problem definition, implementation and solution evaluation

2. **Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

The format of the course follows that of an Engineering Project or independent study. The students register for the course in the fall. The project topic will be introduced to them in the fall by one or more field professionals, and they will start to collect data and work on the project, but will not finish the project in the fall. They continue to work on the project over the winter break and into the spring, and the final project report and presentation is due by the end of the spring.

3. **Rationale for proposed new course:**

The new course is needed as a capstone practicum for the M.S. in Analytical Finance Program

4. **Academic impact on programs affected by new course:**

- a. **Is this proposed new course cross-listed?**

No.

- b. **Identify any known effects of the proposed new course on other programs at the University.**

None

- c. **If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

- (1) **Who was consulted?**

N/A

- (2) **Is the proposed new course acceptable to all affected programs?**

N/A

- (3) **Will any changes be required in the affected programs? If so, describe.**

N/A

- d. **Identify any known effects of the proposed new course on the University's commitment to diversity.**

N/A

**5. Resource Impact Statement:**

**a. Provide each of the following:**

(1) **Library impact statement**  
Minimal

(2) **Computer impact statement**

None. Any computing requirements will be handled by LTS public sites

(3) **Faculty impact statement**

Will be taught by various ISE faculty. At least three ISE faculty are qualified to teach the class.

(4) **Facilities impact statement**

Will require a classroom.

**b. Provide a statement indicating who will assume financial responsibility for any new resources required:**

Financial responsibility will be borne by the ISE department and by CBE

**Graduate and Research Committee**  
**Proposed New Course**

**6. Proposed new course number and course description (as it will appear in course catalogue):**

**IE 447 Stochastic Programming and Portfolio Analysis (3)**

The aim of stochastic programming is to find optimal decisions in problems that involve uncertain data. This field is currently developing rapidly with contributions from many disciplines including operations research, mathematics, and probability. Conversely, it is being applied in a wide variety of subjects ranging from portfolio management to financial planning. This course is suitable for students with a basic knowledge of linear programming, elementary analysis, and probability. We will make a broad overview of the main themes and methods of the subject. There will be a particular emphasis in this course on implementation and tools for solving difficult stochastic programming instances and the application of stochastic programming to financial portfolio analysis

**7. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

The instructional mode will be a combination of lecture and team projects. The course will meet twice a week for 75 minutes each. The course will last a whole semester.

**8. Rationale for proposed new course:**

The new course is needed as a core course for the M.S. in Analytical Finance Program.

**9. Academic impact on programs affected by new course:**

**e. Is this proposed new course cross-listed?**

None.

**f. Identify any known effects of the proposed new course on other programs at the University.**

None.

**g. If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

**(4) Who was consulted?**

N/A

**(5) Is the proposed new course acceptable to all affected programs?**

N/A

**(6) Will any changes be required in the affected programs? If so, describe.**

N/A

**h. Identify any known effects of the proposed new course on the University's commitment to diversity.**

N/A

**10. Resource Impact Statement:**

**c. Provide each of the following:**

**(5) Library impact statement**

The library has adequate resources on mathematical programming, stochastic programming, and portfolio analysis.

**(6) Computer impact statement**

None. Any computing requirements will be handled by LTS public sites

**(7) Faculty impact statement**

Will be taught by various ISE faculty. At least three ISE faculty are qualified to teach the class.

**(8) Facilities impact statement**

Will require a classroom

**d. Provide a statement indicating who will assume financial responsibility for any new resources required:**

Financial responsibility will be borne by the ISE department.

**CSE DEPARTMENT: Proposed New Courses for APC****1. Proposed new course number and course description (as is it will appear in course catalog):**

CSE 445 WWW Search Engines (3)

Study of algorithms, architectures, and implementations of WWW search engines. Information retrieval (IR) models; performance evaluation; properties of hypertext crawling indexing, searching and ranking; link analysis; parallel and distributed IR; user interfaces. This course, a version of 3yy for graduate students, requires research projects and advanced assignments. Credit will not be given for both CSE 345 and CSE 445

**2. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study or other) and number of contact hours per week: 3 hours of lecture****3. Rationale for proposed new course:**

With billions of addressable documents publicly accessible, WWW search engines continue to be fundamental to information seeking on the Web. The scale of these engines, both in content and in access make the algorithms, architectures, and implementations of these systems challenging. This course is designed for upper-level undergraduates and graduate students interested in learning how Web search engines function

This elective course focuses on the technologies for storing and retrieving hypertext from large databases. Particular emphasis is given to the data structures and algorithms needed to build efficient and scalable search engines for the World Wide Web (WWW). Topics covered include: information retrieval (IR) models, performance evaluation, properties of hypertext, crawling, indexing, searching, ranking, link analysis, parallel and distributed IR, and user interfaces. Students will participate in class projects involving both the creation and management of a large document collection on the WWW. This project will require programming in languages such as Perl/CGI, C/C++, or Java

**4. Academic impact on programs affected by new course:**

Is this proposed new course cross-listed? NO

Is the proposed new course acceptable to all affected programs? N/A

If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:

Who was consulted?

Is the proposed new course acceptable to the affected program?

Will any changes be required in the affected programs? If so, describe.

Identify any known effects of the proposed new course on the University's commitment to diversity.

We are unaware of any effects

**5. Resource Impact Statement:**

Provide each of the following:

Library impact statement: None

Computer impact statement: We have used a grant from Lucent foundation to buy the necessary computers

Faculty impact statement: We have recently hired Prof. Brian Davison specifically to teach such a course

Facilities impact statement: No impact

Provide a statement indicating who will assume financial responsibility for any new resources required:

No additional resources beyond the already purchased computers are needed



Proposed New ProgramElectrical and Computer Engineering**MS Degree in Wireless and Networking Engineering****1. Proposed new program mission statement:**

The MS degree in Wireless and Network Engineering at Lehigh University will educate the next generation of engineers for the communications and networking industry as well as feeding the PhD programs in the ECE, CSE and ISE departments. The program will allow students to focus on any one of the many different concentrations needed within the communications and networking industry. Thus students can focus on a broad range of topics including circuit design (ECE topic), network programming (CSE topic), graph theoretic network design optimization (ISE topic), optical networking (of interest to the Center for Optical Technologies) and wireless communication systems engineering (a broad understanding of wireless and networking). That each of these study plans can occur in a single program makes this program truly innovative. On the other hand, this requires the program to be interdisciplinary and to draw on courses from the ECE, CSE and ISE departments. It also requires that the program have a flexible curriculum with a number of choices for students to grow academically. Towards this goal we have limited the required core courses. These courses have been carefully selected so that students with electrical engineering (EE), computer engineering, computer science (CS) or operations research undergraduate backgrounds can take these core courses. These students can learn the essentials and at the same time be prepared to take the advanced classes in *Wireless and Network Engineering* that we also offer.

**Rationale for proposed new program:**

Networking has become the most important aspect of communication systems of today due to the enormous growth of internet and wireless communication systems, and will certainly continue to be so in the future. Tied to the fact that it is the backbone of all information systems, networking involves a large number of issues from diverse perspectives. From a communication theorists' (electrical engineering) perspective networking involves design and analysis of multiple access techniques ways of coping with network congestion and losses, i.e., protocols for routing, retransmissions, flow control, etc. From the computer engineering, computer science and operations research (industrial and systems engineering) point of view networking involves designing the architecture of computer networks network programming and optimization. While each of these disciplines offers courses that involve some aspects of networking in their curriculum, we believe that a graduate curriculum whose aim is to produce *network engineers* who are knowledgeable in all aspects of networking, and therefore are able to contribute to the design and analysis of information systems in the broadest context, is essential. Furthermore, these issues are tightly coupled in a wireless system where the behavior of the physical transmission medium, i.e. the radio channel, has a physical transmission medium, i.e. the radio channel, has a significant effect on all system aspects and overall network performance. Our aim in this proposal therefore is to outline the development of a graduate program in Wireless and Network Engineering and the needs associated with this development.

**2. Description of proposed new program:****a. Admission criteria: (required for Graduate programs only)****(1) minimum requirements**

Same as RCEAS (taken from Graduate Student Handbook p7).

Regular students must meet one of the following conditions:

- (1) have Undergraduate GPA of at least 2.75 out of 4.0.
- (2) have GPA of at least 3.00 for last two semesters of undergraduate study.

- (3) have scores at or above the 75<sup>th</sup> percentile on GRE.
- (4) have GPA of at least 3.00 on a minimum of 12 hours graduate work at other institutions
- (5) have successfully completed the probationary conditions as an associate student

These conditions are necessary but not sufficient (see graduate handbook).

**(2) background courses required**

ECE 81, Math 309 or Math 231, ECE 125 (this may be replaced by ECE 108 after an ECE course update) or their equivalent.

**(3) examination(s) (e.g., GRE, GMAT, etc.) required**

GRE

**(4) language requirement for foreign students**

Minimum of 550 on TOEFL.

**(5) application process for interdisciplinary programs**

ECE will review with help from interested CSE and ISE faculty. We plan to follow the ECE review process to simplify matters.

**(6) admission deadline**

Same as Engineering college (From graduate Student Handbook, p. 7)  
 fall: July 1; spring: Dec 1 summer I: April 30, summer II: May 30

**b. Specific degree requirements:**

**Bachelor's Degree**

- (1) course requirements, including a semester-by-semester roster
- (2) new courses

**Master's Degree:**

- (1) course requirements (new or existing)

We propose a two-year program awarding the MS degree in Wireless and Network Engineering. Consistent with the program's interdisciplinary nature, a flexible curriculum with a number of choices for students to grow academically is needed. Towards this goal we have limited the required core courses to three courses (9 credits) which must be taken by all *Wireless and Network Engineering* MS students. These courses have been carefully selected so that students with electrical engineering (EE), computer engineering, computer science (CS) or operations research (industrial and systems engineering) undergraduate backgrounds can take these core courses. The students will learn the essentials and at the same time be prepared to take the advanced classes in *Wireless and Network Engineering* that we also offer. This fits the interdisciplinary nature we desire while allowing maximum flexibility. As an example, a student could focus on circuit design for wireless communication systems, an EE topic related to *Wireless and Network Engineering*. Alternatively, a student could focus on network programming, a CS topic, or a student can study to become a communication systems engineer, which requires that the student understand all aspects of communication networks in sufficient detail. That each of these study plans can occur in a single program makes this program truly innovative. Of course, this program will require a large set of electives to be offered regularly. By utilizing the courses offered by several disciplines within the university we feel this is easily accomplished. After taking the three core courses (9 credits), a student should take 7 additional courses (21 credits) in advanced topics on Wireless and Network Engineering. Two of these classes (6 credits) can be replaced by Master's thesis research if the student chooses to produce a Master's thesis related to Wireless and Network Engineering. A total of 30 credits are needed for the MS degree.

**Details of the Proposed MS Program**

The 3 core courses (to be offered every year) are:

**Communication Theory (ECE 342):** Establishes the fundamental knowledge of the physical layer of a communication network, i.e., analog and digital communication techniques, modulation, line coding, pulse shaping, detection, bandwidth, basic impairments such as nonlinearities, noise and fading, and the fundamental limits on data communication (prereq: ECE 125, Math 309 or Math 231).

**Fundamentals of Wireless Communications (ECE 441):** Provides the understanding of basic building blocks of a wireless system, the challenges in designing each of these blocks and the knowledge of existing and future wireless systems and standards (prereq: ECE 342)

**Computer Networks (ECE 404):** Provides the understanding of the fundamental issues in networking such as multiple access techniques, routing, congestion control etc and the mathematical tools necessary for this development such as queuing theory (recently cross listed as CSE 404).

In addition to the core courses, the students will have to take advanced courses that are aimed to furnish the student with an advanced knowledge of more specific elements or types of information networks. Such courses (offered regularly, but not necessarily every year) must be chosen from any 300 or 400 level ECE or CSE course. Any 300 or 400 level ISE course in the Operations Research or Information Technology Area will also be allowed. We will also allow other electives that make sense. These can come from other Engineering departments, Mathematics, Physics, and Business/Economics for example. At least 18 credits must be at the 400 level, with at least 15 credits from ECE or CSE.

#### **Implementation Plan**

All of the core courses have been taught. The first two can be taught by Prof. Blum, Prof. Kishore, Prof. Li and Prof. Fritchman. The last course can be taught by Prof. Cheng, Prof. Davison, Prof. Ferevalov, Prof. Tzeng, and Prof. Blum. We believe it is best to start in a Fall semester due to the sequencing.

(2) **thesis requirement**  
optional, same as MSEE degree.

(3) **comprehensive examination requirement**  
none

#### **Doctoral Degree:**

- (1) **language requirement**
- (2) **qualifying or general examination requirement**
- (3) **course requirements**
- (4) **Master's Degree requirement**
- (5) **Faculty availability to direct dissertations**
- (6) **Expected time for earning a degree**

#### **4. Academic Impact Statement:**

a. **Is this proposed new program interdisciplinary?**

Yes. The courses come from ECE, CSE and ISE. The program has been carefully crafted to allow students in ECE, CSE, and ISE to enter the program and easily complete it in 2 years. Students with other backgrounds (mathematics, business, physics should have interest) will be able to complete the program with minimum required preparation.

- b. **Identify any known effects of the proposed new program on other programs at the University.**

None known.

- c. **If there are known effects, individuals in charge of the affected programs must be consulted about the proposed new program and the following information provided:**

- (1) **Who was consulted?**

David Wu from ISE. Ed Kay from CSE.

- (2) **Is the proposed new program acceptable to the affected programs?**

yes

- (3) **Will any changes be required in the affected programs? If so describe.**

no

- d. **Identify any known effects of the proposed new program on the University's commitment to diversity.**

None known.

**5. Resource Impact Statement:**

- a. **Provide each of the following:**

- (1) **Library impact statement**

no impact, the topics are not new just the integrated program.

- (2) **Computer impact statement**

no impact

- (3) **Faculty impact statement**

All of the core courses have been taught. The first two can be taught by Prof. Blum, Prof. Kishore, Prof. Li, and Prof. Fritchman. The last course can be taught by Prof. Cheng, Prof. Davison, Prof. Perevalov, Prof. Tzeng, and Prof. Blum. All of the advanced courses have also been taught. In the future we hope to develop and/or hire expertise in experimental wireless system design and offer "Wireless System Integration and Design" regularly for students to have a more hands-on experience with designing wireless system prototypes. The ECE department did offer this course (last semester) with the help of a visiting faculty member who focused on certain building blocks (such as wireless transceivers) and on RF measurements for testing wireless systems. In the future we hope to expand this into a multiple course sequence and include discussions of specifications, systems, and software issues also. We feel that this would be a nice addition at a later date.

- (4) **Facilities impact statement**

None.

- b. Provide a statement indicating who will assume financial responsibility for any new resources required:



Proposed Course Changes for APCME/MECH**Kind of change, e.g., "change in title"**

Cross list ME442, Engr452, ChE461  
Modify titles and course description

**Current course number and course description (from course catalog):****ME442. Analytical Methods in Engineering I (3) fall**

Analytical methods of solution for discrete and continuous engineering systems. Theoretical, numerical and approximate methods of solution applied to equilibrium characteristic value and propagation types of engineering problems. Staff

**Proposed course number and course description (as it will appear in course catalog):****ME442 (ChE461, Engr 452). Mathematical Methods in Engineering (3) fall**

Analytical techniques are developed for the solution of engineering problems described by algebraic systems, and by ordinary and partial differential equations. Topics covered include: linear vector spaces; eigenvalues, eigenvectors, and eigenfunctions. First and higher-order linear differential equations with initial and boundary conditions; Sturm-Liouville problems; Green's functions. Special functions; Bessel etc. Qualitative and quantitative methods for nonlinear ordinary differential equations; phase plane. Solutions of classical partial differential equations from the physical sciences; transform techniques; method of characteristics.

**Description of proposed change(s):**

Modify title and course description to read the same as current Engr452 title and course description. These courses are currently taught as a single college-wide engineering mathematics course. Engr452 was approved and adopted by the college for this purpose two years ago. No changes in course content will occur.

**Rationale for proposed change(s):**

The proposed changes formalizes the current manner in which the courses are taught.

**Impact Statement:** None



## Proposed Program Changes for Management Science

### **Name and summary of current program:**

Master of Science in Management Science

### **Current catalog description:**

Management Science

The management science program is directed toward integrating scientific methods with the functional aspects of organizations by investigating the application of quantitative methodology and systems analysis in the context of such functional areas as production, finance, logistics, marketing and accounting. This integration provides the students with a broader perspective toward managerial decision-making in both private enterprise and public administration.

Mid-career professionals or undergraduates with a background in engineering, mathematics, physical sciences or business and economics who intend to seek managerial, consulting or systems analyst positions are appropriate candidates. In particular, those candidates who intend to seek positions demanding both technical and management skills find the management science background advantageous in dealing with the complex problems of industrial, commercial, and public service organizations.

The industrial and systems engineering department administers the management science program. To be admitted to the program, a candidate must demonstrate basic competence in calculus, statistics, linear algebra, introductory operations research, accounting, finance, production and microeconomics. A candidate lacking a certain background may be required to take background courses. The minimum program consists of 30 credit hours of course work, of which at least 18 credit hours must be in the 400-level. The ISE graduate faculty coordinator must approve all course work.

The Graduate Programs Office in the College of Business and Economics must approve all graduate business courses (numbered 400 and above). Courses are only open on a space available basis. Students with 2 years of full-time work experience may enroll in other CBE graduate courses as long as they have the proper prerequisites.

### *Quantitative Courses*

(at least 15 credit hours from the following list; no more than 6 credit hours in the 300- level)

IE 305 Simulation (3), Prerequisite: IE 121 and 220

IE 316 Advanced Operations Research Techniques (3), Prerequisite: IE 220

IE 328 Engineering Statistics (3), Prerequisite: MATH 23 or equivalent

IE 339 Applications of Stochastic Processes (3), Prerequisite: IE 220 or equivalent

IE 409 Time Series Analysis (3), Prerequisite: IE 121 or equivalent

IE 410 Design of Experiments (3), Prerequisite: IE 121 or equivalent

IE 411 Networks and Graphs (3), Prerequisite: IE 316 or equivalent

IE 414 Heuristic Methods in Combinatorial Optimization (3), Prerequisite: IE 316 or equivalent

IE 416 Dynamic Programming (3), Prerequisite: IE 316 or equivalent

IE 418 Discrete Optimization (3), Prerequisite: IE 220 or equivalent

IE 431 Operations Research Seminar (3)

IE 439 Advanced Applications of Stochastic Processes (3), Prerequisite: IE 339 or equivalent

ECO 322 Competitor and Market Analysis (3), Prerequisite: ECO 105, 145 and MATH 21, 31 or 51

ECO 358/(IE 358) Game Theory (3), Prerequisite: ECO 105 or 115 and 119 and MATH 21, 31 or 51

ECO 402 Managerial Economics (3), Prerequisite: GECO 401 or equivalent and calculus

ECO 412 Mathematical Economics (3), Prerequisite: Consent of the chair

ECO 413 Advanced Microeconomics Analysis (3), Prerequisite: ECO 402 or equivalent

ECO 414 Advanced Topics in Microeconomics (3), Prerequisite: ECO 401 and GECO 413 or equivalent

ECO 415 Econometrics I (3), Prerequisite: ECO 401 or equivalent

ECO 416 Econometric Theory (3), Prerequisite: ECO 401 or equivalent and calculus

ECO 447 Economic Analysis of Market Competition (3)

ECO 460 Index Numbers and Time Series Analysis (3)  
 ECO 461 Forecasting (3)  
 ECO 462 Adv. Statistics for Business & Economics (3), Prerequisite: Calculus  
 ECO 463/(IE 458) Topics in Game Theory (3). Prerequisite: Two semesters of calculus, ECO 412 and 414,  
 or permission of instructor  
 MATH 334 Mathematical Statistics (3-4) Prerequisite: Math 231 or 309

*Functional Areas*

(at least 12 credit hours from a chosen functional area) prerequisites must be met for all CBE courses.

Area	Example Courses
Accounting	ACCI 307, 309, 315, 316, 317, 324. GBUS 401, 413, 414. MACC 420 492.
Finance	FIN 323, 328, 330, 331, 332, 333, 335, 340, 353. IE 413 GBUS 419, 420, 421, 422, 424, 426, 431, 473. ECO 470. MATH 467 468.
Information Systems	ACCI 311. BIS 311, 331, 342 (SCM 342). CSC 327, 330, 414, 415, 417. IE 307, 309, 310, 341, 342, 343, 408, 415, 437 438.
Marketing	ECO 325/(MKT 325) GBUS 481. ECO 447. MKT 315, 316, 319 320, 321, 330. MSE 421 431.
Production & Logistics	GBUS 450. IE 319, 324 332, 334, 340, 342, 343, 344 415, 419, 422, 424, 443 445, 448, 449, 450 451, MSE 421, 423, 425 427, 433, 446, 496
Public Service	ECO 311, 312 314. FIN 353, 354. ECO 430, 450, 451, 452 453, 454. MG1 331.

**Additional Electives - (3 credit hours)**

Courses suggested in categories I and II, plus others offered by the ISE department the College of Business and Economics and other related fields

**Proposed program changes (as they will appear in the catalog):**

The Industrial and Systems Engineering Department administers the management science program. To be admitted to the program a candidate must demonstrate basic competence in calculus, statistics, linear algebra, introductory operations research, accounting, production and economics. A candidate lacking a certain background may be required to take remedial courses. The minimum program consists of 30 credit hours of course work, of which at least 18 credit hours must be in the 400-level. The ISE graduate faculty coordinator must approve all course work. Upon entering the program, the student must declare an area of concentration listed as follows:

- Operations Research
- Decision and Risk Analysis
- Economics and Cost Analysis
- Production and Operations Management
- Logistics and Supply Chain Management

Each student is required to complete 15 credit hours of core courses, 12 credit hours of courses in the declared area of concentration, and 3-credit hours of approved free elective or completing a management science project. No more than 9 credit hours may be taken from the college of business and economics (e.g., including MKT, GECO, GBUS courses).

### I. Core Courses (at least 15 credit hours)

Course No.	Course Title	Prerequisite(s)
IE 328	Engineering Statistics	Math 23 or equivalent
IE 358	Game Theory	Eco 105 or 115 and 119 and Math 21, 31 or 51
IE 362	Logistics and Supply Chain Management	IE 251 or equivalent
IE 404	Simulation (graduate version of IE305)	IE 121 and IE 220
IE 410	Design of Experiments	IE 121 or equivalent
IE 426	Optimization Models and Applications (graduate version of IE 316)	IE 220 or equivalent
IE 429	Stochastic Models and Applications (graduate version of IE 339)	IE 220 or equivalent
IE 458	Topics in Game Theory	Two semesters of calculus, GECO 412 and GECO 414, or permission of instructor
Math 334	Mathematical Statistics	Math 231 or 309

Note: Students who satisfy one or more of the core requirements from previous coursework (e.g., IE 305/404, 316/426, 339/429) may substitute the core requirement by taking additional courses from his/her declared area of concentration. Up to 9 credit hours may be substituted.

### II. Areas of Concentration (at least 12 credit hours)

Each student must declare an area of concentration. No more than 3 credit hours may be taken outside the declare area of concentration.

Areas of Concentration	Qualified Courses
Operations Research	IE 406, 411, 412, 414, 416, 417, 418, 419, 439, GECO 402, 412, 423 Math 312, 338, 340
Decision and Risk Analysis	IE 358, 458, 409, 410, 416, 419, 439, 442, 446, 451 Math 312, 338 GECO 416, 423, 460, 461
Economics and Cost Analysis	IE 358, 458, 413, GBUS 413, 414, 419*, 420, 422, Math 467, 468
Production and Operations Management	IE 319, 324, 332, 340, 342, 347, 410, 415, 419, 424, 425, 442, 443, 445, 448, 449; GBUS 413, 450, 481, 483, 485. GECO 447 MSE 438, 446
Logistics and Supply Chain Management	IE 309, 319, 341, 358, 408, 409, 412, 414, 415, 416, 419, 425, 438, 443, 458 MKT 321, 325, GBUS 450, 481, GECO 416, 447, 460, 461

\* Daytime section only for students without work experience

### **III. Approved Free Elective or Management Science Project (3 credit hours)**

Each student is to complete either an approved free elective relevant to the student's career interest, or complete a project through IE 430 Management Science Project. A faculty member must supervise the project.

#### **Description of proposed change(s):**

The main changes are as follows:

- The core course list has been streamlined and reduced to 9 courses (a student must take 5)
- The areas of concentration have been completely restructured
- Students who satisfy one or more of the core requirements from previous coursework may substitute for the core requirement by taking additional courses from his/her declared area of concentration. Up to 9 credit hours may be substituted.
- No more than 9 credit hours may be taken from the college of business and economics

#### **Rationale for proposed change(s):**

- The core course list has been streamlined and reduced to 9 courses- (to ensure a common core for the students; core courses will be offered more frequently).
- The areas of concentration have been completely restructured- (to avoid overlap with the M.S. in Analytical Finance and M.S. in Information and Systems Engineering).
- Course substitution - (allows more flexibility for ISE undergraduates entering the program).
- No more than 9 credit hours may be taken from the college of business and economics- (upon request from the CBE; due to AACSB requirements).

#### **Academic Impact Statement:**

##### **Is this proposed program change interdisciplinary?**

Somewhat; the students are allowed to take less CBE classes when comparing to the current program.

##### **Identify any known effects of the proposed program change on other programs at the University.**

Should reduce overlap with other master's programs such as M.S. in Analytical Finance and M.S. in Information and Systems Engineering. It will also reduce the resource load on CBE

##### **If there are known effects, individuals in charge of the affected programs must be consulted about the proposed program change and the following information provided:**

###### **Who was consulted?**

Deans Kathy Trexler and Richard Durand

###### **Is the proposed program change acceptable to the affected programs?**

Yes

###### **Will any changes be required in the affected programs? If so, describe.**

N/A

##### **Identify any known effects of the proposed program change on the University's commitment to diversity.**

N/A

#### **Resource Impact Statement:**

##### **Provide each of the following:**

<b>Library impact statement</b>	N/A
<b>Computer impact statement</b>	N/A
<b>Faculty impact statement</b>	Reduce CBE teaching load; Increase ISE teaching load
<b>Facilities impact statement</b>	N/A

**Provide a statement indicating who will assume financial responsibility for any new resources required:** The ISE department will assume financial responsibility for any new resources required.

## Proposed New Course for APC

### 1. Proposed new course number and course description (as is it will appear in course catalog):

#### **IE 426 Optimization Models and Applications**

Modeling and analysis of operations research problems using techniques from mathematical programming. Linear programming, integer programming, multi-criteria optimization, stochastic programming and nonlinear programming using an algebraic modeling language. This course is a version of IE 316 for graduate students, with research projects and advanced assignments. Closed to students who have taken IE 316. Prerequisite: IE 220 or equivalent background.

### 2. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:

The instructional mode will be a combination of lecture and team projects. The course will meet twice a week for 75 minutes each; or three times a week for 50 minutes each. The course will last a whole semester.

### 3. Rationale for proposed new course:

To create a graduate version of IE 316, an intermediate course in operations research. The course is among the required core for the proposed Management Science program.

### 4. Academic impact on programs affected by new course:

M.S. in Information and Systems Engineering

**Is this proposed new course cross-listed?** no

**Is the proposed new course acceptable to all affected programs?** yes

**If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

**Who was consulted?** ISE faculty

**Is the proposed new course acceptable to the affected program?** yes

**Will any changes be required in the affected programs? If so, describe.**

**Identify any known effects of the proposed new course on the University's commitment to diversity.**

IE 316 is a required core course for M.S. in Information and Systems Engineering. This requirement should be replaced with the course IE 426.

### 5. Resource Impact Statement:

#### a. Provide each of the following:

(1) **Library impact statement**

The library has adequate resources on mathematical programming and optimization.

(2) **Computer impact statement**

None. Any computing requirements will be handled by LIS public sites.

(3) **Faculty impact statement**

Will be taught by various ISE faculty. At least four ISE faculty are qualified to teach the class.

(4) **Facilities impact statement**

Will require a classroom.

#### b. Provide a statement indicating who will assume financial responsibility for any new resources required:

Financial responsibility will be borne by the ISE department

## Proposed New Course for APC

**1. Proposed new course number and course description (as is it will appear in course catalog):**

**IE 429 Stochastic Models and Applications**

Introduction to stochastic process modeling and analysis techniques and applications. Generalization of the Poisson process; renewal theory and applications to inventory theory, queueing, and reliability; Brownian motion and stationary processes. This course is a version of IE 339 for graduate students, with research projects and advanced assignments. Closed to students who have taken IE 339. Prerequisite: IE 220 or equivalent background.

**2. Instructional mode (i.e., lecture, recitation, laboratory, seminar, independent study, or other) and number of contact hours per week:**

The instructional mode will be a combination of lecture and team projects. The course will meet twice a week for 75 minutes each; or three times a week for 50 minutes each. The course will last a whole semester.

**3. Rationale for proposed new course:**

To create a graduate version of IE 339, an intermediate course in stochastic models of operations research. The course is among the required core for the proposed Management Science program.

**4. Academic impact on programs affected by new course:**

**Is this proposed new course cross-listed?** no

**Is the proposed new course acceptable to all affected programs?** N/A

**If there are known effects, individuals in charge of the affected programs must be consulted about the changes and the following information provided:**

**Who was consulted?** N/A

**Is the proposed new course acceptable to the affected program?** N/A

**Will any changes be required in the affected programs? If so, describe.**

**Identify any known effects of the proposed new course on the University's commitment to diversity.**

**6. Resource Impact Statement:**

**c. Provide each of the following:**

**(5) Library impact statement**

The library has adequate resources on stochastic processes and queueing theory.

**(6) Computer impact statement**

None. Any computing requirements will be handled by I IS public sites.

**(7) Faculty impact statement**

Will be taught by various ISE faculty. At least two ISE faculty are qualified to teach the class.

**(8) Facilities impact statement**

Will require a classroom.

**d. Provide a statement indicating who will assume financial responsibility for any new resources required:**

Financial responsibility will be borne by the ISE department.

## **Proposed Graduate Certificate Program in "Nanomaterials"**

### **1. Mission statement:**

Nanotechnology and nanomaterials are becoming important in a wide range of industries. Some of the concepts in these areas lie just outside typical physics, chemistry, and materials courses. The proposed group of courses will address this deficiency for people in industry, government, and academia who took their coursework either outside the field or more than a few years ago. Particular stress will be placed on two areas: (1) nanocharacterization methods and (2) the differences between nanomaterials and bulk materials of the same composition. Examples will be shown of nanometer-sized technological structures related to electronics, photonics, catalysis, and biotechnology.

### **2. Rationale:**

Typically materials science, chemistry, physics, electrical engineering, and biology departments use different materials synthesis methods and different instrumentation for physical characterization of materials. However as the interfaces among these disciplines begin to blur, students need to have a working knowledge of a broad range of instrumentation to solve nanotechnology problems. The time when a nanotechnology research project can be carried on with just one type of microscope and one type of diffraction apparatus is gone. Many of the nanotech devices now contemplated are below the size regime of typical microscopes and diffraction systems. In a sense, no work in nanotechnology can proceed without the use of nanocharacterization tools, yet these tools are often the most complex analytical instruments ever manufactured. Not only is there a need to analyze the microstructure of nanometer-sized materials, but the chemical and physical properties of these structures must be assessed. No one tool can do this. The researcher must be familiar with a broad range of synthesis schemes and characterization tools

### **3. Description of proposed new program:**

#### **Admission criteria:**

- B.S. degree in chemistry, physics, or any branch of engineering
- Undergraduate GPA: 3.00 or higher
- Undergraduate chemistry, physics, and mathematics through differential equations and linear algebra
- Pre-requisite: An introductory materials course similar to Lehigh's Mat 33
- Admission policies will be the same as for other graduate students in materials science and engineering
- TOEFL score > 550

The application process would be similar to other interdisciplinary graduate programs. Eventually several departments may participate, but the program would begin in the Dept. of Materials Science and Engr.  
Application deadline: January 15

**Certificate Program Requirements:**

Two core courses to give a common background in materials and nanotechnology  
Two elective courses from a list provided

**Requirements for Completion of Certificate:**

Completion of at least 12 credits  
Not more than one grade below B-  
All other university requirements apply, such as deadlines and fees  
All work must be completed in 3 years

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**Transferability:**

Credits earned towards a certificate may be accepted as part of a master's or Ph.D. degree program in materials science and engineering  
Normal time limits for completion of an advanced degree program apply (i.e., a total of 6 years for the master's or 10 years for the doctorate) beginning with the date of enrollment in the certificate program

**Core Courses**

**Materials for Nanotechnology (3)**

(Mat 398/498/478)

This course, offered on both an undergraduate and a graduate level, begins with an introduction to the nanoworld and how we see the nanoworld through transmission electron microscopy. Other topics include: probing nanosurfaces, carbon as a nanomaterial, fullerenes, carbon nanotubes, metal clusters, metal nanoparticle preparation, and directed self-assembly of nanoparticles. Also discussed are the thermal, chemical, electronic, optical, and magnetic properties of metal nanoparticles, nanowires, semiconductor nanoparticles, and inorganic nanoparticles.

**Strategies for Nanocharacterization (3)**

(Mat 397/497/477)

Lectures describe various nanocharacterization techniques in terms of which technique is best for specific measurements. Special attention paid to spatial resolution and detection limits for SEM, TEM, X-ray analysis, diffraction analysis, ion beam techniques, surface techniques AFM and other SPMs, and light microscopies and spectroscopies

## Current Elective Courses

### Thin Film Processing And Mechanical Behavior (3)

(Mat 397)

Metallic, ceramic and glassy films, with thickness less than approximately 1  $\mu\text{m}$ , formed by gas phase deposition. Thin film applications, vacuum fundamentals, PVD and CVD, models for general thin film growth, epitaxial growth, sources of stress, deformation mechanisms, and mechanical characterization techniques such as substrate curvature and nanoindentation. Prerequisite: Mat33. Also recommended, but not required is some experience with mechanics of materials.

### Electron Microscopy and Microanalysis (4)

(Mat 334)

Fundamentals and experimental methods in electron optical techniques including scanning electron microscopy (SEM), conventional transmission (TEM) and scanning transmission (STEM) electron microscopy. Specific topics covered will include electron optics, electron beam interactions with solids, electron diffraction and chemical microanalysis. Applications to the study of the structure of materials are given. Prerequisite: consent of the department chair

### Crystallography and Diffraction (3)

(Mat 333)

Introduction to crystal symmetry, point groups, and space groups. Emphasis on materials characterization by x-ray diffraction and electron diffraction. Specific topics include crystallographic notation, stereographic projections, orientation of single crystals, textures, phase identification, quantitative analysis, stress measurement, electron diffraction, ring and spot patterns, convergent beam electron diffraction (CBED) and space group determination. Applications in mineralogy, metallurgy, ceramics, microelectronics, polymers, and catalysts. Lectures and laboratory work.

### Advanced Transmission Electron Microscopy (4)

(Mat 423)

The theory and practice of operation of the transmission and scanning transmission electron microscope. Techniques covered include bright field, high resolution and weak-beam dark field, lattice imaging, diffraction pattern indexing and Kikuchi line analysis. The theory of diffraction contrast is applied to the interpretation of electron micrographs. Specimen preparation techniques. Prerequisite: Mat 334 or equivalent.

### Advanced Scanning Electron Microscopy (4)

(Mat 427)

The theory and practice of operation of the scanning electron microscope and electron microprobe. Techniques covered will include high-resolution scanning, quantitative electron probe microanalysis. Electron beam sample interactions. X-ray spectrometry and electron optics will be discussed in detail. Prerequisite: Mat 334 or equivalent.

#### 4. Academic Impact Statement

a. **Interdisciplinary program:** This certificate program provides the basis for understanding nanomaterials and nanocharacterization. Since the materials and technologies involved may be related to, and students may be drawn from, various disciplines, program may be considered interdisciplinary. We hope, soon, to add courses from other departments to the list of acceptable electives. We also hope that, by bringing in other departments, it will be possible (in the near future) to offer a Master's degree in this area.

b. **Effects on other University programs:** This certificate program will support nanotechnology research efforts in various departments across the University.

#### 5. Resource Impact Statement:

a. **Library impact statement:** Since Lehigh University has in place a strong materials characterization program, there should be little specific impact. There may be the need for one or two new "nanomaterials" or "nanotechnology" journals that are not now in the library. Note: There is an expected need for new nanotechnology-related journals of interest to various disciplines. This need may not yet have been recognized by individual departments. It should be realized that, just because this program has "nano" in its title, this new program must not be considered the only program impacting the library in the general area of nanotechnology.

b. **Computer impact statement:** no new requirements expected.

c. **Faculty impact statement:** no new requirements expected. Several recent hires in various departments may be offering courses that could be included in the list of electives.

d. **Facilities requirement:** no new requirements expected

C. E. Lyman  
Dept. of Materials Science and Engineering  
3-2-04

**Proposal:**  
**Master of Science in Analytical Finance**  
Co-sponsored by the Perella Department of  
Finance, the Department of Industrial & Systems Engineering and the  
Department of Mathematics

A Proposal to the College/Academic Policy Committee and CRC

**1. Proposed new program mission statement:**

The program's academic objective is to provide students with a strong education in advanced finance and quantitative financial analysis tools, grounded in a common series of courses. This sequence will provide key concepts from financial theory, applied mathematics, and engineering. With these building blocks, program graduates will become instrumental in the creation of innovative solutions for real financial problems, using state of the art analytical techniques and computing technology.

**2. Rationale for proposed new program:**

This program will be a joint venture, sponsored by departments from each of the three colleges: the Perella Department of Finance, the Department of Industrial & Systems Engineering and the Department of Mathematics. Also, the Department of Economics will provide additional courses. The proposed program is designed for students who already have strong quantitative backgrounds. In particular, this would include students with undergraduate degrees in computer science, economics, engineering, finance, mathematics, and the hard sciences (physics/chemistry). The program is intended to enhance the career prospects of such individuals.

We envision our targeted market of prospective students to come from two backgrounds. The main and initially largest group of students should likely come straight from mathematically rigorous undergraduate programs in one of the disciplines listed above. These students will need exposure to graduate topics that prepare them for entry into a first job in financial services and to be upwardly mobile within their firm or industry faster than other entrants without this degree. The second group of potential students would be early-to-mid-career professionals from industry, either to hone and further skills already learned on the job or to retool their quantitative skills, developing into financial services specialists.

Also, we have surveyed LU alumni and other professionals with engineering or technical undergraduate degrees who work in the financial industry. They have encouraged us to create a program for students who already have a strong quantitative education and interests but need advanced courses focused specifically on the financial market environment. This program will fulfill a market demand for specialists in financial firms who can bridge the gap between financial analysts and programmers.

### 3. Description of proposed new program:

#### Program Structure

All students enrolled in this Master of Science Program must successfully complete at least 33 graduate credit hours in a common set of analytical, financial, and computational courses. A capstone project with an industrial firm will draw key elements of the program for a final academic experience. The program design allows students to complete the course requirements in one calendar year provided the set of prerequisites are met. Such a feature will enhance the marketability of the program.

#### Timing

We anticipate that, if approved in early 2004, the first students will enter in the Fall '04 semester.

#### Program Learning Objectives

Analytical finance involves the application of financial modeling, mathematics and engineering in order to solve actual financial problems and make better financial decisions. The curriculum is intended for career opportunities in areas such as portfolio management, securities trading, investment banking, risk management and financial information systems.

Upon completing this MS program, a graduate will be able to add value to his/her firm's pricing, hedging, trading and portfolio management decisions by being able to:

1. Conceptualize real world problems with both mathematical tools/models and theories of investment instruments and financial portfolio management;
2. Demonstrate proficiency in locating/creating, managing and analyzing large scale data sets with advanced computing tools;
3. Integrate tools in probability/statistics, optimization, simulation and information technology, to design financial instruments, transactional systems, and technology-enabled solutions;
4. Bridge the knowledge and skill gaps between financial professionals (e.g., asset managers) and computing/execution professionals (e.g., IT specialists);
5. Communicate key empirical results within the context of the financial marketplace and macroeconomic environment to non-quantitative financial specialists.

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#### a. Admission criteria:

##### (1) minimum requirements

An applicant must have an undergraduate degree from a mathematically rigorous program such as computer science, economics, engineering, finance, operations research, mathematics, or the sciences (physics/chemistry).

##### (2) background courses required

Some of these background courses will be available via the Web, such as Eco 1; Fin 225. Also, Acct 108 and 151, Eco 129, 401, Math 21, 22, 23, 205 and 231 are usually offered every summer, though not on the Web.

### Entrance Prerequisites (Examples given from Lehigh Courses)

<b>Must show basic competency in the following areas: (Does not count towards the 33 credit minimum degree requirement)</b>
<i>Finance:</i> (Fin 225 or IE 226) or an equivalent introductory course including investment and capital budgeting
<i>Corporate Finance:</i> Fin 328 or GBUS 419 or an equivalent course
<i>Investment &amp; Portfolio Management:</i> Fin 323 or GBUS 420 or an equivalent course
<i>Financial Accounting:</i> Acct 151 (and Fin 225); or, Acct 108 (and IE 226); GBUS 401 could replace Acct 151 or 108 or an equivalent accounting course
<i>Economics:</i> Micro and macro principles (Eco 1); money, banking, and financial markets (Eco 129) or an equivalent course
<i>Statistics:</i> Math 231 or an equivalent statistics course including regression analysis
<i>Mathematics:</i> Calculus (Math 21, 22, 23) or an equivalent calculus series; linear algebra (Math 43 or 205 or 242) or equivalent course

#### (3) examination(s) (e.g., GRE, GMAT, etc.) required

*Admission standards:* An applicant must meet the minimum CBE or ISE graduate entrance standards. CBE requires an acceptable GMAT score (current mean score is 615) and 3.0 undergraduate GPA; ISE requires GRE quantitative and analytical scores no less than 75% and 3.0 senior year GPA. Any exceptions will be reviewed and approved by the co-directors.

#### (4) language requirement for international students

International students will have their English skills evaluated through the TOEFL and GMAT/GRE scores upon admission. If the TOEFL and GMAT/GRE scores do not meet our requirements, students may be required to take the summer English Immersion program offered by ESL and to submit new TOEFL and SPEAK scores. If the scores do not meet our requirements, the students must continue with ESL and may not take graduate level courses until they have met our English requirements. The TOEFL minimum score is 250 and the SPEAK minimum score is 230.

#### (5) application process for interdisciplinary programs

*Application review committee:* The two college co-directors will meet as a joint program admissions committee to review and evaluate applications in a timely manner. The Associate Deans for Graduate Programs in each college will serve as ex officio members.

**(6) admission deadline:** Applications are due by July 15. When an application is received within two weeks before the start of fall classes, the student may be admitted on an associate student basis.

*Presidential Scholars:* Applications that will entail the use of a Presidential Scholarship should be submitted by April 1 of the prior spring semester to start in the summer or fall. A Presidential Scholar could be denied admission to the program due to space limitations.

Students will be encouraged to apply by May 1 so that they can enroll in Fin 422 - Derivatives in the first Summer Session.

**b. Specific degree requirements: Master's Degree**

**(1) course requirements (new or existing)**

<b>Master of Science in Analytical Finance***</b>	
<b>Course Requirements (33 credits minimum)*</b>	
<i>Analytical Core</i>	
Math 467 (3 credits) Financial Calculus I	Stat 410 (3 credits) Probability and its Applications***
Math 468 (3 credits) Financial Calculus II	Eco 415 (3 credits) Econometrics
IE 316 (3 credits) Optimization Models and Applications	
<i>Finance Core</i>	
GBUS 422 (3 credits) Derivatives	GBUS 473 (3 credits) International Finance
GBUS 421 (3 credits) Advanced Investments	
<i>Computing Core</i>	
Eco 424 (3 credits) Advanced Numerical Methods	IE 447 (3 credits) Stochastic Programming and Portfolio Analysis
<i>Capstone Practicum</i>	
IE 441 (3 credits) Financial Engineering Projects	

\* Students with equivalent courses from an undergraduate degree program will be given credit for fulfilling the field requirement and will be permitted to replace the credits from the list of approved electives (see Appendix). The program director(s) must approve courses for each student's choice of electives.

\*\* This course is in the revision process and will be renamed "Random Process and Applications" for the 1-04 catalog.

\*\*\* The sequence of courses is shown in the Appendix.

**(2) thesis requirement:** None

**(3) comprehensive examination requirement:** None

[**Doctoral Degree:** Does not apply Masters degree only.]

**4. Academic Impact Statement:**

**a. Is this proposed new program interdisciplinary?**

Yes, this program will be a joint venture between the Perella Department of Finance, the Department of Industrial & Systems Engineering, and the Department of Mathematics. Courses from the Department of Economics are also required for program participants.

**b. Identify any known effects of the proposed new program on other programs at the University.**

The Financial Services Laboratory, for which we envision especially heavy usage by courses in this program, will be available to students from across the campus, creating a new learning resource for the

whole University. Also, IE 441, Financial Engineering Projects (3), will be initiated into the course approval process by the IS&E department as the capstone experience-based course

#### **Relationship with Other Current Financial Services Initiatives**

The mission of Lehigh University's Financial Services Studies Center is to promote the study of the array of financial services encountered in domestic and global settings. Financial services are the activities conducted in the fields of finance, accounting, economics, and frequently involves the allied disciplines of business strategy, computer science, law, mathematics, operations research, and real estate. Therefore, the Center and this newly created Master's program should complement one another in the advancement of the study of financial services. All of the participating departments in the MS program can use and benefit from the Financial Services Lab for both teaching and research. All three, the Center, Lab and this academic MS program, form a major thrust in the current CBE strategic plan.

#### **c. If there are known effects, individuals in charge of the affected programs must be consulted about the proposed new program and the following information provided:**

##### **(1) Who was consulted?**

The following individuals have participated in our discussions: Deans from the CBE, RCEAS and CAS; Chairs and participating faculty of Economics, Finance, Industrial and Systems Engineering and Mathematics; the Director of the Rauch Center for Business Communications has been involved in the detailed planning of the Financial Services Laboratory and its operations. For the management and maintenance of the additional information resources, the Library and Technology Services personnel have been included. We consulted an informal advisory group, "Lehigh Wall Street," of alumni; George Kledaras (CEO - Kledaras Technologies), David Barges (CTO - NYSE), Jeff Byrne (VP - Goldman Sachs), and Andrew Fife (Bear) for the design of the program. Finally, we surveyed a number of Lehigh alums and financial specialists who know the employment needs of the industry. Both the advisory group and a number of the people surveyed have volunteered to help with internships, externships and course projects.

##### **(2) Is the proposed new program acceptable to the affected programs?**

Yes, all departments who have courses included in this proposal have agreed.

#### **Program Management**

Following current models of cross college joint programs, there would be one director from the Freella Department of Finance (CBE) and from the Department of IS&E (RCEAS). A small oversight group of faculty could join the directors in the strategic management of the program (For example, the IBE directors are Steve Buehl and Bob Storer, and the IBE steering committee includes the two directors and Art King, Rick Weisman and David Wu). This group will report to the deans of the participating colleges. The participating colleges will jointly confer the degree. Thus, the registrar could classify this program as an "Intercollegiate Program," (IC) similar to the CSB program

#### **Daily Operations (including but not limited to budget monitoring)**

These would be located in the CBE in the Graduate Programs Office similar to IBE (daily ops in the CBE) and CSB (daily ops in RCEAS), but with both directors having access to services, budgets, records.

#### **Revenue Model**

The deans have already set the precedent for the revenue streams for previous courses and programs. The tuition revenue follows the faculty member and department offering the course.

#### **(3) Will any changes be required in the affected programs? If so, describe.**

See #2 above. Also, for course staffing the participating department chairs and deans have committed the faculty teaching resources required to operate the program. Because this program is designed to use existing courses as much as possible to achieve efficiency and economies of scale across multiple departments' graduate programs, we expect the enrollment in the courses listed in this proposal to increase. This may result in offering other courses less frequently.

#### **d. Identify any known effects of the proposed new program on the University's commitment to diversity.**

Insofar as many of the students who gravitate towards mathematically rigorous programs have an international origin, the participants in this new program may improve Lehigh's cultural diversity. Moreover, because the program design is cross disciplinary, this should improve scholarly diversity. Students will have the opportunity to learn from multiple viewpoints, which will help them communicate with differing constituencies within a firm once employed.

#### **5. Resource Impact Statement:**

##### **a. Provide each of the following:**

##### **(1) Library impact statement:**

None expected beyond the Financial Services Lab data sets that are in the process of being acquired.

##### **(2) Computer impact statement:**

The Financial Services Lab will provide new facilities, information resources and statistical analysis software. (See 4b. above)

##### **(3) Faculty impact statement:**

Existing faculty will staff courses. The chairs and the deans agree that they will support this new program. A cap of 15-20 students is imposed for the academic year 2004-2005. This constrain is being implemented on the number of student entering into the program due to the impact on our other program offerings. For example, the other finance courses are also electives/requirements within the MBA, MS Accounting and Information Analysis, MS Economics, and the PhD in Economics.

##### **(4) Facilities impact statement:**

The CBE Dean is in the fundraising stage for the Financial Services Laboratory to be constructed in Rauch. The Perella Department of Finance has committed to provide the CBE program co-director, the secretarial services and the initial physical record keeping space for the program.

##### **b. Provide a statement indicating who will assume financial responsibility for any new resources required:**

The sets of course and faculty resources will come from the CBE (Finance and Economics Departments), the RCEAS (Department of Industrial and Systems Engineering), and CAS (Department of Mathematics). Each dean and chair has agreed to take financial responsibility.

Furthermore, the CBF Dean has taken responsibility for the Financial Services Laboratory. Expenses for promotional material, student recruiting and other miscellaneous expenses will be approved by the Directors and the costs will be shared equally by the CBE and RCEAS

### APPENDIX

<b>Approved Electives</b>		
GBUS 424 (3 credits) Adv. Topics in Financial Mgt	Eco 460 (3 credits) Time Series Analysis	IE 339 (3 credits) Stochastic Models
GBUS 425 (3 credits)* Real Estate Finance & Investing	Eco 461 (3 credits) Forecasting	IE 404 (3 credits) Simulation
GBUS 426 (3 credits)* Financial Institutions	Eco 463/IE 458 (3 credits) Topics in Game Theory	IE 409 (3 credits) Time Series Analysis
GBUS 431 (3 credits)* Quantitative Finance	Math 463 (3 credits) Advanced Probability	IE 410 (3 credits) Design of Experiments
Eco 416 Econometric Theory	Stat 434 (3 credits) Mathematical Statistics	IE 411 (3 credits) Networks and Graphs
Eco 423 (3 credits) Real Options	Stat 438 (3 credits) Regression Analysis	IE 413 (3 credits) Advanced Engineering Economy and Replacement Analysis

\* Not currently offered.

<b>Sequence of courses</b>		
<i>Summer(pre or post)</i>	<i>Fall</i>	<i>Spring</i>
GBUS 422 (3 credits) Derivatives	Math 467 (3 credits) Financial Calculus I	Math 468 (3 credits) Financial Calculus II
	GBUS 473 (3 credits) Adv. International Finance	GBUS 421 (3 credits) Advanced Investments
	IE 316 (3 credits) Optimization Models and Applications	IE 4xx (3 credits) Stochastic Programming and Portfolio Analysis
	Eco 415 (3 credits) Econometrics	Eco 424 (3 credits) Advanced Numerical Methods
	IE 4yy (3 credits) Financial Engineering Projects This course will begin in Fall and conclude in the Spring semester.	Stat 410 (3 credits) Probability and its Applications