New Undergraduate Course Approval Cover Form
Montana State University

This four-page form collects basic information about the proposed new course, provides information on the approval process, and includes all required approvals. Additional information (see INFO sheet) is also required as part of the New Course Packet.

Proposed New Course Information

Requested Rubric, Course Number, Core Designation (if needed): EFIN 401
Example: PHL 361 RH

Course Title: Engineering & Economic Financial Management II
Abbreviated Course Title (≤ 30 chars): Engr & Econ Fin Mgmt II
First Semester to be Offered: Fall 2014
Submitted by: Durward K. Sobek II
dsobek@le.montana.edu
Submitter's Contact Info: Phone, Email: x7140
Instructor: Myles Watts
Department: Ag. Econ. & Econ.
College: COA & CLS

New Course Review Process

| Instructor completes the New Course Packet, with Core Information if a Core designation is requested. |
| Department Head’s signature indicates that course has been approved by the process used within the Department. |
| The Chair of the College Curriculum Committee signs to indicate College academic approval. |
| The College Dean signs to indicate that adequate resources are available to offer the course. Supporting information (Dean’s Statement) is typically required. |
| The New Course Packet (as PDF) is uploaded to the Provost's Office server for distribution to other committees. |
| Course requests are sent to Curriculum and Program Committee (CPC). Core reviews are sent to appropriate Core subcommittees. Committees work in parallel when possible to speed approval process. Special topics courses (291,491) skip the CPC review (limited to two years). |
| Provost's Office reviews the new course request. New courses are submitted to MUS for Common Course Number (CCN) review. Dean and Department informed upon approval. |
| Approved new course sent to Registrar for Inclusion in the Catalog and Schedule of Classes. |

Note: This diagram illustrates the typical flow path, but at any review step there can be a request for additional information or modifications. Careful review in early steps is the best way to speed the overall process. * Special topics courses (91) require fewer signatures, but cannot be offered more than two times without committee review.

APPROVALS

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<thead>
<tr>
<th>Durward K. Sobek II</th>
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<tr>
<td>Submitter</td>
<td>Date</td>
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<tr>
<td>Ruhul Amin</td>
<td>1/16/2014</td>
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<tr>
<td>Department Head</td>
<td>1/15/2014</td>
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<tr>
<td>Chair, College Curriculum Comm.</td>
<td>Date</td>
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<tr>
<td>Christine M. Foreman</td>
<td>12/10/2013</td>
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<tr>
<td>Dean</td>
<td>Date</td>
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<td>Chair, Core Subcommittee (if app.)</td>
<td>Date</td>
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<td>Chair, CPC</td>
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<td>Assoc. Provost</td>
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INFORMATION NEEDED FOR COMMON COURSE NUMBERING

The process for identifying a common course number for a new course is as follows:

1. Course learning outcomes are prepared for the new course.
2. The person submitting the new course request looks at the CCN website to see if a course with similar outcomes already exists in the MUS system.

   www.mus.edu/Qtools/CCN/ccn_default.asp

   • If a course exists with at least 80% of the same outcomes, the course is considered "equivalent" to the proposed new course, and the new course should use the existing rubric and course number.

   • If no "equivalent" course is found, the person submitting the new course request should identify a unique course number that has not been used by any other course in the MUS system.

3. The requested rubric and course number are submitted as part of the new course packet.
4. The Provost's Office submits the learning outcomes and the requested rubric and course number to the MUS to have a course number assigned to the course. (This will typically be the requested course number, but it could be changed.)
5. The assigned common course number is reported back to the person submitting the new course request.

Requested Rubric, Course Number, Core Designation (if needed):

Course Title: EFIN 401
Abbrev. Course Title (≤ 30 char): Engineering & Economic Financial Management II
Credits: 3
Department Offering Course: Engr & Econ Fin Mgmt II
College: Ag. Econ. & Econ.
COA & CLS

Is this course "equivalent" to a course in the MUS System?: □ Yes  ☑ No

Learning Outcomes for the Course:

Students will:

• Comprehend complex financial management instruments and summarize how those instruments are developed.

• Analyze financial statements and credit risk models.

• Utilize numerical analysis and numerical methods to solve real-world financial risk management problems faced by large financial institutions and other firms.
INFORMATION REQUIRED BY THE REGISTRAR

The data needed to enter the new course into the MSU Catalog and Schedule of Classes is collected on this page. Once the new course has been approved, this page is automatically forwarded to the Registrar for data entry.

Assigned Rubric, Course Number, Core Designation (if needed): EFIN 401

Course Title (for Catalog): Engineering & Economic Financial Management II

Course Title (for Schedule of Classes, 30 characters, max.): Engr & Econ Fin Mgmt II

First Semester to be Offered: Fall 2014

Restricted Entry/Consent of Instructor Required: ☐ Yes ☐ No

Instructor's GID (last 4 digits only): 9549

Department Offering Course: Ag. Econ. & Econ.

College: COA & CLS

Is the requested course number available? (x4155 to check): ☐ Yes ☐ No

Frequency of course offering: ☑ Annually ☐ Alternate Years, starting ______

Semester(s) offered (check all that apply): ☑ Summer ☑ Fall ☐ Spring

Summer Options (check all that apply): ☐ First 6 weeks ☐ Second 6 weeks ☐ 12 weeks

Credits by mode of instruction:

Lecture: 3

Seminar:

Independent Study:

Lab/Studio:

Recitation/Discussion:

TOTAL CREDITS: 3

Primary Mode(s) of Delivery:

☑ Face-to-face ☐ Web-Enhanced (small on-line comp.)

☐ On-Line Only ☐ Blended (significant on-line portion)

Time and Location – Call the Registrar’s Office at x4155 to find a time and location for the course.

Assigned Day(s): M ☑ Tu ☑ W ☑ Th ☐ F ☐ Sa ☐ Su

Assigned Time(s): 1610-1725

Assigned Building: LINH

Assigned Room: 109A

Capacity (room capacity, or enrollment “cap”): 8

Co- and Pre-Requisites – Courses numbered 200 and above are normally expected to have prerequisites. When listing multiple prerequisites, please separate courses with “and” if both are required, or “or” if only one is required.

Prerequisite(s): EFIN 301

Co-Requisite(s):

Course Description – Provide a course description of 40 words or less for the MSU Catalog.

This is the second course in the financial engineering course sequence. Financial engineering develops and manages financial strategies and tools in financial management. Topics include optimization, depreciation, risk management, asset value models, stress testing, credit derivatives, & regulation.
DEAN'S STATEMENT

The reviewing committees are being asked to take a closer look at the resources required for each proposed new course. In many cases new courses will replace existing courses and the new course request is effectively resource neutral, however that is not always the case. For example, a new elective course that would result in distributing an existing student population across a larger number of courses would represent a significant increase in expenditures for the new course, and no increase in total student credit hours. A funding mechanism for such a course would need to be identified. The Dean’s Statement is the place to document how the costs of the proposed new course will be covered.

The Financial Engineering program was recently (September 2013) approved by the Board of Regents. The new program will be managed jointly by departments in two colleges: the Department of Mechanical and Industrial Engineering in the College of Engineering and the Department of Agricultural Economics and Economics in the College of Agriculture. This course, Engineering and Financial Economic Management II- EFIN401, is part of the new program. Please see the Dean's statement from the College of Agriculture, November 14 2013: "I fully support approval of EFIN 101, EFIN 301 and EFIN 401 as new courses. These courses will be integral to the newly developed Financial Engineering program; an interdisciplinary program between the College of Agriculture (COA) and the College of Engineering. The College of Agriculture will financially support the initial development of these courses with either reallocated Agriculture Economics and Economics resources or possible new resources obtained through the normal college or university resource distribution process. Steady state cost of offering the courses will be justified through growth of the program." The College of Engineering also supports the development of these new courses in conjunction with the College of Agriculture.
New Undergraduate Course Narrative
Montana State University
Updated August 23, 2012

Please provide the following information in narrative format. Substantive responses to all criteria are required. Although not required, a draft syllabus can also be helpful to the committee in understanding the details of the proposed course.

General Course Information
1. Requested Rubric, Course Number, and Core Designation (if any)
   > EFIN 401

2. Course Title
   > Engineering & Economic Financial Management II

3. Provide a general description of the course explaining the need for the course, its goals, and its overall structure. This is the most important part of the application and should offer a good sense of what students will experience by taking this class.
   > This is the second course in the financial engineering course sequence. Financial engineering develops and manages financial strategies and tools in financial management. Topics include optimization, depreciation, risk management, asset value models, stress testing, credit derivatives, & regulation. The student will become familiar with complex financial management instruments and will be introduced to how those instruments are developed. Actual (but simplified) real world problems faced by large financial institutions and other firms facing complex financial risk management challenges will be used to illustrate these topics.

4. Based on what types of student work (e.g., tests, homework assignments, papers, performances, etc.) will grades be determined?
   > 3 Hour Exams Including the Final: 75%
   Quizzes (including take home quizzes): 25%
5. Provide a course content outline containing all major topics plus a brief description of the material to be covered under each major topic heading.

> See attached syllabus

6. List required texts or other required references.

> See attached syllabus.

7. What are the estimated enrollment and student credit hour (SCH) production?
   \[ \text{SCH} = (\text{enrollment} \times \text{credits}) \]

> Enrollment = 15; SCH = 45

8. Will there be an enrollment cap that restricts enrollment below the level of student demand? If so, what is the enrollment cap and why is it necessary?

> No

9. Will course be a "restricted enrollment" course? If so, why is restricted enrollment necessary?

> No.

10. Describe how the success of the course will be evaluated? ("End-of-semester student evaluations" is not the answer to this question. How will the instructor determine if the learning outcomes are being met, and how will the department determine if the course is fulfilling its intended purpose?)

> Student enrollment, accreditation review, financial engineering internal and external advisory committees, student and industry feedback.

11. Is the instructor a member of the regular faculty (i.e., tenured or tenure-track)? If no, please describe the instructor's qualifications, attach a Vita, and provide a separate letter of support, signed by the department head (or appropriate unit director), addressing the instructor's qualifications to teach this course.

> Regular tenured faculty member.

Level of Offering

12. Has the course been offered previously under 280/291 or 480/491? If so, when? Under what number? What was the enrollment? What level of students took the course?

> Yes; ECNS 491; Spring 2013; Enrollment = 7; primarily junior and seniors

13. Justify the level of course offering.
Complex mathematical and statistical material typically only offered at the junior or senior within economics, engineering, and statistics programs. This is the second of a sequence of courses in the new Financial Engineering Major, and is expected to be completed during students' senior year once they have completed all of major courses.

Relationship to other Courses, Curricula, and Departments

14. Does this course build on or interrelate with other courses in your curriculum or related curricula? If so, which ones?

> Yes; Course builds on the material covered in EFIN 301, which is a junior level course with 200-level and 300-level economics and engineering courses as prerequisites.

15. Do the topics in the proposed course duplicate or reiterate those in other courses in this or any other department? If so, how do the coverage and educational experience differ and how is this duplication or reiteration justified? Also, what liaison (which is expected in cases of apparent overlap) has been conducted with other departments? Report reactions, both favorable and unfavorable.

> No, the material is not covered in any other course offered by MSU. The proposed major and courses in financial engineering have been reviewed by the finance department in the College of Business at MSU and the business faculty at U of M at Missoula. They found that the material is sufficiently different to not overlap with existing finance courses. The proposed course addresses the construction of new financial instruments, a topic not covered by existing business finance courses. Further, the analysis elements of the course require higher-level mathematics, including advanced statistics, as well as more advanced economics knowledge versus existing finance courses.

16. What programs (departments, colleges) will be impacted by the SCH production of this course? That is, where do you think the SCH in the proposed course are likely to come from? If the expected SCH production of the proposed course is greater than 1000, and the SCH are expected to come from other colleges, what steps have been taken to make the other units aware of the potential loss of SCH? Report reactions, both favorable and unfavorable.

> The financial engineering major is offered jointly by the Department of Agricultural Economics and Economics and the Department of Mechanical and Industrial Engineering; both departments will be sources of the SCH for this major, along with new students.

17. If this proposed course has a significant interdisciplinary component, please explain briefly. Otherwise, indicate n/a.

> This course is at the crossroads of economics and engineering. The principles of financial engineering analyzed in this course are constructed through the combination of engineer's strong system modeling is used in combination with financial economic principles.

Students Served

18. Does the proposed course serve majors only? Non-majors only? Both majors and non-majors? What other majors might be interested in this course? State areas or disciplines to be served and indicate the specific efforts that will be made to make the course material relevant to all disciplines served.
> Predominantly majors and minors. Some students from other fields such as economics, ag. bus., business, and engineering disciplines will periodically enroll.

**Resources**

19. What additional resources (e.g., additional instructional FTE, required technologies), if any, will be required to offer this course? Are there any resource issues for the students who will take the course (e.g., required technologies, travel, on-line access requirements)? Will there be an additional fee charged to students taking this course? Please explain.

> At this time, no additional resources are necessary.

20. What existing information resources – print (books, journals, documents), audiovisual (videos, DVDs, CDs or other), and/or electronic (e-books, databases, electronic journals and web sites) – provided by the MSU Libraries will be used by students in this course? Provide examples as well as descriptive information. If additional information resources are necessary, please discuss those acquisitions with the library (x6549 Collection Development) at least three months prior to the beginning of the semester in which this course will be taught.

> No additional information resources are necessary.

**Other Supporting Material**

21. Include any additional information you feel is needed to support this request.

> The course was part of the proposal for a new degree program which was discussed widely with the Colleges of L&S, Ag, Engineering and Business; and was vetted through Faculty Senate before reaching the Board of Regents. See the attached BOR application for the financial engineering major.
EFIN 401  
Engineering and Economic Financial Management II  
Fall 2014

Instructor: Myles Watts  
Office: 104 Linfield Hall  
Phone: 406-994-3780  
E-mail: mwwatts@montana.edu

Texts:  
Introduction to Credit Risk Modeling by Bluhm et al.  
Essentials of Investments by Bodie et al.  
Corporate Director’s Responsibility, American Bar Association  
Price Theory and Applications by Hirshleifer et al.  
Introduction to Actuarial Methods, International Finance Corporation, WBG  
“Some Aspects of the Pure Theory of Capital,” QJE (1937) by Samuelson - Article  
“Asset Replacement Principles,” AJAE (1972) by Perrin - Article

Learning Outcomes:
Students will:
• Comprehend complex financial management instruments and summarize how those instruments are developed.  
• Analyze financial statements and credit risk models.  
• Utilize numerical analysis and methods to solve real-world financial risk management problems faced by large financial institutions and other firms.

Course Description:
This is the second course in the financial engineering course sequence. Financial engineering develops and manages financial strategies and tools in financial management. Topics include optimization, depreciation, risk management, asset value models, stress testing, credit derivatives, & regulation. The student will become familiar with complex financial management instruments and will be introduced to how those instruments are developed. Actual (but simplified) real world problems faced by large financial institutions and other firms facing complex financial risk management challenges will be used to illustrate these topics.

2. Grading  
The "course score" and course grade will be computed as the weighted average of your 3 exams (including the final): 75% and quizzes (including take home quizzes): 25%.

On a 100 point scale, grades will be allocated as follows:


The third exam for this course will be held during MSU's scheduled final exam time for this class. ALL students are required to take the third exam.
Topic List

- Review of Optimization: Optimization of a function including both first and second order conditions, marginality, and corner solutions
- Separation Theorem (Static and Intertemporal): Conditions under which optimization can occur without knowledge of consumer utility
- Mathematics of Credit and Discounting Including IRR: Mechanics of converting financial stocks to flows (and vice versa) and the use in financial decision making
- Build Up Approach to Interest Rate--OTC Pricing: Common method to calculate the interest rate charged on a loan
- Introduction to Actuarial Methods --OTC Pricing: Statistical methods used to price risk either in insurance premium or interest rate
- Simple Valuation including Risk and Return: Valuing an asset including the adjustment for the volatility of future income generated by the asset
- Efficient Diversification: Methods of choosing the composition of a financial portfolio
- Basics of Credit Risk Management: Estimating the loan loss function, probability of default, and loss given default and analogous insurance relationships
- Basel Capital Requirements: Calculation of the capital requirements for financial institutions as recommended by the International Committee on Banking (Basel)
- Modeling Correlated Defaults: Including loan default correlation across counter parties in capital requirement estimation
- Asset Value Models: Valuation methods of assets and their effect on equity and capital adequacy
- Pure Theory of Capital: Saumuelson’s classic discussion of the intertemporal accumulation of capital and the implication for financial decision making
- Samuelson's Theory of Depreciation: Logically consistent depreciation and valuation schemes
- Faustmann’s Replacement: Optimal replacement of finite lived durable assets
- Securitization: Process of obtaining capital to finance pools of debt
- Rating of Reinsurance and Tranche Rating: Process of risk rating pools of debt or insurance contracts when various investors are bearing the risk of non-performance within the pool profile
- Relationship Between Insurance and Credit: Explicit specification of the relationship between the pure risk rate in insurance and the risk component of interest rates
- Financial Statement including Asset and Capital Quality: Capital adequacy requires not only sufficient quantity of capital but also quality of capital.
- Performance Evaluations (PE, Sales, Income, ROE, DA, DE, EPS): Common performance criteria for publicly traded companies
- Capital Issues (PO, Convertibles, Basel, Mark to Market): Challenges in calculating and evaluating capital quantity and quality
- CreditRisk Model: An example of model used to evaluate the capital required of a large complex financial institution
- Stress Testing (Capital and Liquidity): Evaluation of the ability of financial institution to absorb adverse conditions and outcomes
- Risk Measure and Capital Allocation including Value at Risk: Value at Risk modeling using parametric and monte carlo simulation approaches
- Credit Derivatives and Swaps: Derivative markets are used to ameliorate risk. Primary focus on interest rates swaps that convert variable to fixed interest rates and visa versa.
- Collateralized Debt Obligation: Transferring the risk of loan default to parties that do not own the debt
- Prepayment Risk: Analysis of prepayment risk when interest rates change such that prepayment is advantageous to the borrower but disadvantages to the lender
- Counter Party Risk: Analysis of non-performance of a contractual obligation of a counterparty due to financial failure
- Management and Director Compensation: Dodd Frank rules on director and management compensation
- Regulation and Examination: Regulation processes and description of regulators
- Board of Director Responsibilities: Directors have certain responsibilities required by law and liabilities