

## New Course Proposal Template

Steps to the approval process:

1. Complete the applicable template(s) and email them to the departmental or program curriculum committee chair.
2. The curriculum chair emails the proposal to the curriculum committee, then to the department/program faculty for a vote and finally to the department/program chair.
3. The department/program chair emails the proposal to [curriculum-approval@iup.edu](mailto:curriculum-approval@iup.edu); this email will also serve as an electronic signature.
4. Curriculum committee staff will log the proposal, forward it to the appropriate dean's office(s) for review within 14 days and post it on the X Drive for review by all IUP faculty and administrators. Following the dean's review the proposal goes to the UWUCC/UWGC and the Senate.
5. Questions? Email [curriculum-approval@iup.edu](mailto:curriculum-approval@iup.edu).

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| Contact Person:        | Dr. Francisco Alarcon | Email Address: | falarcon@iup.edu |
| Proposing Depart/Unit: | Mathematics           | Phone:         | 724-357-2608     |

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| Course Prefix/Number  | See the Registrar's list of Unavailable course numbers at <a href="http://www.iup.edu/WorkArea/linkit.aspx?LinkIdentifier=id&amp;ItemID=129323">http://www.iup.edu/WorkArea/linkit.aspx?LinkIdentifier=id&amp;ItemID=129323</a> .<br>MATH 448   |
| Dual/Cross Listed   | <i>Dual Listed = Courses listed at two levels, such as undergraduate and graduate, masters and doctoral, etc. Cross Listed = Course has more than one prefix such as GEOG/RGPL 233.</i><br><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If yes with: <a href="#">Click here to enter text.</a>  |
| Number of Credits   | (UG) Class Hours - 3<br>(UG) Lab Hours - 0<br>Credits - 3   |
| Prerequisite(s)   | MATH 115 or MATH 125 or MATH 121; AND MATH 214 or MATH 216 or MATH 217  |
| Corequisite(s)  | <i>This means that another course must be taken in the same semester as the proposed course</i><br><a href="#">Click here to enter text.</a>  |
| Additional Information<br>(Check all that apply. Note: Additional documentation will be required) | <input type="checkbox"/> Liberal Studies (please also complete Template C)<br><input type="checkbox"/> Teacher Education (Is it Step 1 a prerequisite or is it part of the Professional Education Sequence If so please also complete Template D)<br><input type="checkbox"/> Distance Education (Please also complete Template E)  |
| Course Title  | Introduction to Financial Mathematics   |
| Recommended Class Size (optional) (provide justification)   | Are you recommending a class size: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If yes: (check one of the following reasons and provide a narrative explanation)<br><input type="checkbox"/> Pedagogical <input type="checkbox"/> Physical limitation of classroom<br><input type="checkbox"/> Accreditation body standards/recommendations<br><input type="checkbox"/> Other<br>Explanation (required): <a href="#">Click here to enter text.</a>  |
| Catalog Description   | <i>Guidelines: Do not include pre/co-requisite information here. The registrar prefers a concise description of course content, beginning with an active verb.</i><br>A rigorous mathematical treatment of the theory associated with financial transactions is undertaken. Geometric series and other concepts are used to construct mathematical models for analytically pricing various financial securities based on the time value of money. Studies how to construct mathematical models for pricing cash flows and |

Template A

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|  | explores the equivalency of different cash flows. Includes a detailed study of interest theory and financial economics. Prepares students for the Society of Actuaries Financial Mathematics (FM) exam.   |
| <p><b>Student Learning Outcomes</b></p> <p><i>(These should be measurable, appropriate to the course level, and phrased in terms of student achievement, not instructional or content outcomes)</i></p> <p><i>If dual listed, indicate additional learning objectives for the higher level course.</i></p> | <ul style="list-style-type: none"> <li>• apply the mathematical theory associated with financial transactions and the time value of money.</li> <li>• apply mathematical methods to synthesize the theory of interest, and its applications to annuities, cash flows, loans, bonds, portfolios, and immunization.</li> <li>• understand interest theory and its applications to solve problems in the field of financial economics.</li> <li>• implement mathematical theory to solve problems involving derivatives, options, forwards, futures, swaps, hedging, and other investment strategies.</li> <li>• develop the conceptual framework necessary to be successful on the Society of Actuaries Financial Mathematics (FM) exam.</li> </ul>   |
| <p><b>Brief Course Outline:</b></p> <p><i>Give an outline of sufficient detail to communicate the course content to faculty across campus. It is not necessary to include specific readings, calendar, or assignments.</i></p>   | <ul style="list-style-type: none"> <li>• Time value of Money (5 hours): accumulation functions, future/current/present/net present values, discount factor and discount rate, force of interest and equation of values</li> <li>• Annuities and Cash Flows (5 hours): annuity-immediate, annuity due, perpetuity, continuously payable and level payment annuities, arithmetic and geometric increasing/decreasing annuities</li> <li>• Loans (5 hours): terms of loan, amortization, drop payments/balloon payments, sinking fund</li> <li>• Bonds (5 hours): amortization of premium, accumulation of discount, redemption, par, and face value, yield, coupon, and coupon rate, callable/non-callable bonds</li> <li>• General Cash flows and Portfolios (5 hours): yield rate and rate of return, dollar-and time-weighted rates of return, duration and convexity, spot and forward rate</li> <li>• General Derivative (2 hours): Short selling, short and low position, ask/bid price, bid-ask spread, credit risk</li> <li>• Options (2 hours): call/put options, strike price and expiration, European/American/Bermudan options</li> <li>• Swaps (1 hours): prepaid/deferred/simple commodity/interest rate swaps</li> <li>• Hedging and Investment Strategies (3 hours): hedging, arbitrage, and spread, diversifiable/non-diversifiable risk, collar/straddle/strangle/butterfly strategies</li> </ul> |
| <b>Rationale for Proposal</b>  |   |
| <p>Why is this course being proposed?</p>  | <p>We are proposing an Actuarial Science Track under the mathematics major. Exam FM is a required exam for anyone who is pursuing any credential from the Society of Actuaries (SOA). The SOA is the largest professional organization serving actuarial members and the public in the United States, Canada and worldwide. This course will provide students with the rigorous mathematical background to be successful on Exam FM.</p>  |
| <p>How does it fit into the departmental curriculum? (Check all that apply)</p>  | <p> <input type="checkbox"/> Major Requirement                      <input type="checkbox"/> Minor Requirement                      <input type="checkbox"/> Core Requirement<br/> <i>(Interdisciplinary core – e.g. Business/Education)</i> </p> <p> <input type="checkbox"/> Required Elective                      <input type="checkbox"/> Liberal Studies                      <input type="checkbox"/> Open Elective         </p> <p> <input checked="" type="checkbox"/> Other - Requirement for Actuarial Science Track         </p>  |

Template A

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| <p>Is a similar class offered in other departments?</p>   | <p><input type="checkbox"/> Yes<br/>Please provide comment: <a href="#">Click here to enter text.</a></p> <p><input checked="" type="checkbox"/> No</p>  |
| <p>Does it serve the college/university above and beyond the role it serves in the department?</p>  | <p><input checked="" type="checkbox"/> Yes<br/>Please provide comment: This course will be open to students who meet the prerequisites and are interested in the career of actuaries, such as finance or economics majors. This course re-builds connections to the finance and economics departments that were severed when the Mathematics/Economics major was put into moratorium. This course offering will enhance the degrees of students in these areas by enticing them to understand underlying mathematical theories, pursue additional upper-level mathematics courses, and consider a minor in mathematics.</p> <p><input type="checkbox"/> No</p> |
| <p>Who is the target audience for the course?</p>   | <p><input checked="" type="checkbox"/> Course Designed for Majors ( <input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required)</p> <p><input type="checkbox"/> Course Designed for Minor <span style="float: right;"><input type="checkbox"/> Departmental Elective</span></p> <p><input type="checkbox"/> Restricted to Majors/Minors <span style="float: right;"><input type="checkbox"/> Open to Any Student</span></p> <p><input type="checkbox"/> Liberal Studies</p> <p><input checked="" type="checkbox"/> Other - Students who are interested in pursuing an actuarial career.</p>  |
| <p>Implications for other departments</p>   | <p>A. What are the implications for other departments (<i>For example: overlap of content with other disciplines, requirements for other programs</i>)?<br/>The course content does not overlap with other disciplines.</p> <p>B. How have you addressed this with other department(s) involved? What was the outcome of that attempt? (<i>Attach documents as appropriate</i>)<br/>Communication and support have been obtained from the Finance and Legal Studies Department. See attached documentation.</p>  |
| <p><b>For Dean's Review</b></p>   |  |
| <p>• Are resources available/sufficient for this course? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>• Is the proposal congruent with college mission? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>• Has the proposer attempted to resolve potential conflicts with other academic units? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>Comments: <a href="#">Click here to enter text.</a></p> |  |