

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; 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.

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

Course Prefix/Number	<p><i>See the Registrar's list of Unavailable course numbers at http://www.iup.edu/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=129323.</i></p> <p>MATH 416</p>
Dual/Cross Listed	<p><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></p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes with: Click here to enter text.</p>
Number of Credits	<p>(UG) Class Hours - 3 (UG) Lab Hours - 0 Credits - 3</p>
Prerequisite(s)	MATH 363 or MATH 411 or ECON 356 or permission of the instructor
Corequisite(s)	<p><i>This means that another course must be taken in the same semester as the proposed course</i></p> <p>Click here to enter text.</p>
Additional Information (Check all that apply. Note: Additional documentation will be required)	<p><input type="checkbox"/> Liberal Studies (please also complete Template C)</p> <p><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)</p> <p><input type="checkbox"/> Distance Education (Please also complete Template E)</p>
Course Title	Time Series Analysis
Recommended Class Size (optional) (provide justification)	<p>Are you recommending a class size: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes: (check one of the following reasons and provide a narrative explanation)</p> <p><input type="checkbox"/> Pedagogical <input type="checkbox"/> Physical limitation of classroom</p> <p><input type="checkbox"/> Accreditation body standards/recommendations</p> <p><input type="checkbox"/> Other</p> <p>Explanation <i>(required)</i>: Click here to enter text.</p>
Catalog Description	<p><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></p> <p>.An applied statistics course in the analysis and forecasting of time series data. Linear time series regression models, ARIMA models, SARIMA models, GARCH models, and spectral theory are used to examine time series data. Emphasizes the applied aspects of these models. Computer software is used for data analysis.</p>

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<p>Student Learning Outcomes</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>	<p>Students completing the course will be able to</p> <ul style="list-style-type: none"> • Model time series data and make forecasts based on deterministic linear time series models. • Model stationary time series and make forecast using ARIMA and SARIMA models. • Model time series using ARCH and GARCH models. • Use spectral theory to analyze time series data.
<p>Brief Course Outline:</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"> A. Introduction and Fundamental Concepts (6 hours) <ol style="list-style-type: none"> 1. A review of important distributional theory including random variables, expected value, independence, and covariance. 2. An introduction to time series and stochastic processes. 3. Stationary processes and remedies for non-stationarity. B. Deterministic Trend Modeling (6 hours) <ol style="list-style-type: none"> 1. Systematic versus random variation in time series. 2. Using linear and polynomial regression models for time series data. 3. Using linear and harmonic models for seasonal time series data. 4. Model diagnostics for deterministic trend models. 5. Forecasting using deterministic trend models. C. Stationary Time Series Models (6 hours) <ol style="list-style-type: none"> 1. Using moving average and autoregressive models for stationary time series data. 2. Using ARMA models for stationary time series data. 3. Forecasting using stationary time series models. 4. Model diagnostics for stationary time series models. D. Non-Stationary Time Series Models (6 hours) <ol style="list-style-type: none"> 1. Using ARIMA models for non-stationary time series data. 2. Using SARIMA models for seasonal non-stationary time series data. 3. Forecasting using non-stationary time series models. 4. Model diagnostics for non-stationary time series models. E. ARCH and GARCH Models for Time Series Data (7 hours) <ol style="list-style-type: none"> 1. Introduction to volatility and time series data. 2. Using ARCH models for time series data. 3. Using GARCH models for time series data. 4. Relationship between GARCH and ARMA models. 5. Forecasting using GARCH models. F. Spectral Analysis (6 hours) <ol style="list-style-type: none"> 1. Fourier representation of finite sequences and continuous functions.

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	<ol style="list-style-type: none"> 2. Spectral representations of stationary processes. 3. Spectral representations of seasonal processes. 4. Estimation of the spectrum and its use in modeling. <p>The times listed allow for 3 one hour exams.</p>
Rationale for Proposal	
Why is this course being proposed?	We are proposing an Actuarial Science Track under the mathematics major. A Time Series Course provides Validation through Educational Experience (VEE) towards 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.
How does it fit into the departmental curriculum? (Check all that apply)	<input type="checkbox"/> Major Requirement <input type="checkbox"/> Minor Requirement <input type="checkbox"/> Core Requirement <i>(Interdisciplinary core – e.g. Business/Education)</i> <input type="checkbox"/> Required Elective <input type="checkbox"/> Liberal Studies <input type="checkbox"/> Open Elective <input checked="" type="checkbox"/> Other - Requirement for Actuarial Science Track
Is a similar class offered in other departments?	<input type="checkbox"/> Yes Please provide comment: Click here to enter text. <input checked="" type="checkbox"/> No
Does it serve the college/university above and beyond the role it serves in the department?	<input checked="" type="checkbox"/> Yes 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. <input type="checkbox"/> No
Who is the target audience for the course?	<input checked="" type="checkbox"/> Course Designed for Majors (<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required) <input type="checkbox"/> Course Designed for Minor <input type="checkbox"/> Departmental Elective <input type="checkbox"/> Restricted to Majors/Minors <input type="checkbox"/> Open to Any Student <input type="checkbox"/> Liberal Studies <input checked="" type="checkbox"/> Other - Students who are interested in pursuing an actuarial career.
Implications for other departments	<p>A. What are the implications for other departments (<i>For example: overlap of content with other disciplines, requirements for other programs</i>)? 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? (Attach documents as appropriate) Click here to enter text.</p>
For Dean's Review	
<ul style="list-style-type: none"> • Are resources available/sufficient for this course? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA • Is the proposal congruent with college mission? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA • Has the proposer attempted to resolve potential conflicts with other academic units? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA 	

Template A

Comments: [Click here to enter text.](#)