Code # Enter text…

**New Course Proposal Form**

**[ ] Undergraduate Curriculum Council**

**[X] Graduate Council**

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| **[X] New Course or [ ] Experimental Course (1-time offering) (Check one box)** |

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

Email completed proposals to [curriculum@astate.edu](mailto:curriculum@astate.edu) for inclusion in curriculum committee agenda.

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| --- | --- |
| Suzanne Melescue 3/30/2017 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Jie Miao 3/30/2017 **Department Chair:** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (If applicable)** |
| David F. Gilmore 4/11/2017 **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| John M. Pratte 4/11/2017 **College Dean** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Graduate Curriculum Committee Chair** |
| |  |  | | --- | --- | | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |   **General Education Committee Chair (If applicable)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Vice Chancellor for Academic Affairs** |

1. Contact Person (Name, Email Address, Phone Number)

Ferebee Tunno, ftunno@astate, x8135

2. Proposed Starting Term and Bulletin Year

Spring 2018

3. Proposed Course Prefix and Number (Confirm that number chosen has not been used before. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

STAT 6433

4. Course Title – if title is more than 30 characters (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).

Time Series Analysis

5. Brief course description (40 words or fewer) as it should appear in the bulletin.

Topics include stochastic processes, stationarity, autocovariance and autocorrelation, filtering and smoothing, ARMA processes, and spectral analysis.

6. Prerequisites and major restrictions. (Indicate all prerequisites. If this course is restricted to a specific major, which major. If a student does not have the prerequisites or does not have the appropriate major, the student will not be allowed to register).

1. Are there any prerequisites? Yes
   1. If yes, which ones?

STAT 4453 (Probability & Statistics I) and MATH 3243 (Linear Algebra)

* 1. Why or why not?

After having had these two courses, students will have both the statistical maturity and the exposure to matrices needed to succeed in this course.

1. Is this course restricted to a specific major? No
   1. If yes, which major? Enter text...

7. Course frequency(e.g. Fall, Spring, Summer). *Not applicable to Graduate courses.*

Enter text...

8. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.

Lecture only.

9. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental, or other [please elaborate])

Standard letter.

10. Is this course dual listed (undergraduate/graduate)?

No.

11. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)

No

1. If yes, please list the prefix and course number of cross listed course.

Enter text...

1. Are these courses offered for equivalent credit?

Please explain. Enter text...

12. Is this course in support of a new program? Yes

a. If yes, what program?

M.S. in Statistics (in development stage)

13. Does this course replace a course being deleted? No

a. If yes, what course?

Enter text...

14. Will this course be equivalent to a deleted course? No

a. If yes, which course?

Enter text...

15. Has it been confirmed that this course number is available for use? Yes

*If no: Contact Registrar’s Office for assistance.*

16. Does this course affect another program? No

If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.

Enter text...

**Course Details**

17. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)

Week 1: Random variables, expectation, and variance. Week 2: Covariance and Projection Theorem. Week 3: Matrix review and Central Limit Theorem. Week 4: First of three R tutorials, and random walks. Week 5: Stationarity and autocovariance. Week 6: Autocorrelation and backwards shifts. Week 7: Differencing, filtering and smoothing. Week 8: Linear Predictors and second of three R tutorials. Week 9: AR(1) processes. Week 10: Innovations and AR(p) processes. Week 11: AR(p) processes (continued). Week 12: MA(q) processes. Week 13: ARMA(p,q) processes. Week 14: ARMA(p,q) processes (continued) and third of three R tutorials. Week 15: Spectral analysis.

18. Special features (e.g. labs, exhibits, site visitations, etc.)

None.

19. Department staffing and classroom/lab resources

None.

1. Will this require additional faculty, supplies, etc.?

20. Does this course require course fees? No

*If yes: please attach the New Program Tuition and Fees form, which is available from the UCC website.*

**Course Justification**

21. Justification for course being included in program. Must include:

a. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)

This course will add more variety to the already existing set of graduate level statistics courses our department offers and will help facilitate the M.S. in Statistics degree that is in the works. After taking this course, students will have a good exposure to how certain stochastic processes work and also how to use the statistical software package R.

b. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.

This course fits in well with our department’s mission of providing a “robust mathematical experience where students gain valuable skills in problem solving, critical thinking, and effective communication of mathematical concepts and models.” In particular, it serves our graduate students seeking a Masters degree (math or stats) and prepares them “for a variety of future endeavors and careers in business, industry, government, research, and academia.” Time series analysis can specifically be applied to econometrics, climatology, and signal processing. (Quotations taken from department webpage.)

c. Student population served.

Graduate students seeking M.S. in Mathematics and also those (ultimately) seeking M.S. in Statistics.

d. Rationale for the level of the course (lower, upper, or graduate).

The advanced nature of the subject demands that it be graduate level. All other universities that offer Time Series Analysis make it a graduate course as well.

**Assessment**

**University Outcomes**

22. Please indicate the university-level student learning outcomes for which this new course will contribute. Check all that apply.

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| * 1. **[ ]** Global Awareness | * 1. **[ ]** Thinking Critically | * 1. **[ ]** Information Literacy |

**Relationship with Current Program-Level Assessment Process**

23. What is/are the intended program-level learning outcome/s for students enrolled in this course? Where will this course fit into an already existing program assessment process?

Enter text...

24. Considering the indicated program-level learning outcome/s (from question #23), please fill out the following table to show how and where this course fits into the program’s continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

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| **Program-Level Outcome 1 (from question #23)** | Type outcome here. What do you want students to think, know, or do when they have completed the course? |
| Assessment Measure | Please include direct and indirect assessment measure for outcome. |
| Assessment  Timetable | What semesters, and how often, is the outcome assessed? |
| Who is responsible for assessing and reporting on the results? | Who (person, position title, or internal committee) is responsible for assessing, evaluating, and analyzing results, and developing action plans? |

*(Repeat if this new course will support additional program-level outcomes)*

**Course-Level Outcomes**

25. What are the course-level outcomes for students enrolled in this course and the associated assessment measures?

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| **Outcome 1** | Students who complete this course should be able to define, explain, and utilize the basic properties of a stochastic process, of which a time series is one example. |
| Which learning activities are responsible for this outcome? | In-class lectures and homework problems. |
| Assessment Measure | A rubric will be used to score student solutions to both homework exercises and test problems. |

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| **Outcome 2** | Students who complete this course should be able to compare and contrast various ARMA processes. |
| Which learning activities are responsible for this outcome? | In-class lectures and homework problems. |
| Assessment Measure | A rubric will be used to score student solutions to both homework exercises and test problems. |

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| **Outcome 3** | Students who complete this course should be able to make use of a statistical software package (such as R or SAS) to analyze, model and simulate various time series phenomena. |
| Which learning activities are responsible for this outcome? | In-class demonstrations and homework problems. |
| Assessment Measure | A rubric will be used to score student solutions to both homework exercises and test problems. |

**Bulletin Changes**

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| **Instructions** |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Follow the following guidelines for indicating necessary changes.**  **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.**  - Deleted courses/credit hours should be marked with a red strike-through (~~red strikethrough~~)  - New credit hours and text changes should be listed in blue using enlarged font (blue using enlarged font).  - Any new courses should be listed in blue bold italics using enlarged font (***blue bold italics using enlarged font***)  *You can easily apply any of these changes by selecting the example text in the instructions above, double-clicking the ‘format painter’ icon 🡪 , and selecting the text you would like to apply the change to.*  *Please visit* [*https://youtu.be/yjdL2n4lZm4*](https://youtu.be/yjdL2n4lZm4) *for more detailed instructions.* |

**STAT 5463. Probability and Statistics II** Point and interval estimation, testing hypotheses, standard statistical tests, correlation and regression, and non-parametric methods. Prerequisite: STAT 5453.

**STAT 6433. Time Series Analysis** Topics include stochastic processes, stationarity, autocovariance and autocorrelation, filtering and smoothing, ARMA processes, and spectral analysis. Prerequisites: STAT 4453, MATH 3243, or equivalent.

**STAT 6613. Nonparametric Statistics** Topics include hypothesis testing using data from unknown distributions, tests of independence, tests of goodness-of-fit, rank correlation, and simple linear regression. Prerequisite: STAT 3233 or equivalent.

**STAT 6623. Statistical Methods with SAS Programming** Point estimation, interval estimation, and tests of significance for comparing two population means and proportions. Power analysis and choosing sample size. Nonparametric methods and Chi-square tests. Linear regression, analysis of variance and multiple comparison procedures. Other topics as time permits. Prerequisite: STAT 3233 or equivalent.

**STAT 6643. Multivariate Analysis** Topics include the bivariate normal distribution, multiple and partial correlation, canonical correlation, discriminate analysis, multivariate analysis of variance (MANOVA), and factor analysis. Prerequisite: STAT 3233, MATH 3243, or equivalent.

**STAT 6653. Data Analysis I: Regression Analysis** Simple and multiple linear regression, related estimation and hypothesis testing, model selection, examination of residuals, multicollinearity diagnostics, outliers and influence, qualitative predictor variables, logistic regression. Prerequisite: STAT 3233 or equivalent.

**STAT 6663. Data Analysis II: Analysis of Variance (ANOVA)** Single-factor, two-factor, and multifactor analysis of variance (ANOVA), related estimation and hypothesis testing, multiple comparison procedures, random effects models, analysis of covariance, ANOVA in some standard experimental designs. Prerequisite: STAT 6653 or permission of instructor.

**STAT 6673. Design of Experiments** Replication, randomization, and blocking, analysis of variance, full and factorial experiments at two and three levels, effect aliasing, design resolution and minimum aberration criteria, nonregular designs and complex aliasing, introduction to response surface methodology. Prerequisite: STAT 3233 or equivalent.

**STAT 6703. Statistical Analysis I** Applications of elementary statistics. Advanced principles including statistical study, data gathering, variance and covariance. Prerequisite : STAT 4453 or equivalent.

**STAT 6713. Statistical Analysis II** A continuation of STAT 6703.

**STAT 6723. Probability** Abstract probability spaces, random variables, conditional probability, independence, types of convergence, sums of independent random variable, stochastic processes. Prerequisite: MATH 4553.

**STAT 6833. Biostatistics** Applications of advanced statistical techniques to the Life and Health Sciences. Topics include estimation and hypothesis testing, single and multiway analysis of variance (ANOVA), linear regression, correlation and frequency analysis. Prerequisite: an introductory level statistics course.