|  |
| --- |
| For Academic Affairs and Research Use Only |
| Proposal Number | SM25 |
| CIP Code:  |  |
| Degree Code: |  |

**Reconfiguration of Existing Degree Program Proposal Form**

(Also requires Arkansas Department of Higher Education (ADHE) approval)

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|

|  |  |
| --- | --- |
|  Hong Zhou  | 10/25/2021 |

**Department Curriculum Committee Chair** |

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**COPE Chair (if applicable)** |
|

|  |  |
| --- | --- |
| Amanda Lambertus | 10/25/2021 |

**Department Chair** |

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**Head of Unit (if applicable)**   |
|

|  |  |
| --- | --- |
| Mary Elizabeth Spence | 10/6/2021 |
| **Director of Assessment** |  |

 |

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**Undergraduate Curriculum Council Chair** |
|

|  |  |
| --- | --- |
| John Hershberger 10/28/2021 | Enter date |

**College Curriculum Committee Chair** |

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**Graduate Curriculum Committee Chair** |
|

|  |  |
| --- | --- |
| Lynn Boyd | 10/29/2021 |

**College Dean** |

|  |  |
| --- | --- |
| Alan Utter | 11/16/2021 |

**Vice Chancellor for Academic Affairs** |
|

|  |  |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Enter date |

**General Education Committee Chair (if applicable)**   |  |

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

Amanda Lambertus, alambertus@astate.edu, 972-3090

1. **Title(s) of degree programs to be consolidated/reconfigured:**

BS Mathematics and BS Finance and BS Information Systems and Business Analytics

1. **Proposed title of consolidated/reconfigured program:**

B.S. Actuarial Science

1. **Proposed Effective Date:** Fall 2022
2. **Reason for proposed program consolidation/reconfiguration:**

*(Indicate student need/demand (projected enrollment) for the proposed program and document that the program meets employer needs using the ADFA Workforce Analysis Form)*

Over the past five years, the Department of Mathematics & Statistics has fielded inquiries and requests for students regarding an Actuarial Science degree. These students then major in mathematics with minors in statistics or finance or both. Due to this request, the Department asked for a workforce analysis. According to the workforce analysis, there are no actuarial science programs in the state of Arkansas. According to the Bureau of Labor Statistics the job outlook for next 10 years shows a 24% growth rate with entry level jobs having bachelor’s degrees. In addition, the degree was proposed to mathematics faculty on the ASUCQ campus. It was enthusiastically received and they believe the major would be relevant on that campus as well.

1. **Provide current and proposed curriculum outline by semester.**

*For undergraduate programs, please use Appendix A-8-semester plan form*

 *Indicate total semester credit hours required for the proposed program. If new courses are needed for the reconfiguration, approval for the courses must be requested prior to approval for the new degree. Underline any new courses. Identify required general education core courses with an asterisk. If utilizing courses from other departments, please color-code them and provide a key.*

1. **Will the proposed degree be offered:**
	1. **Traditional/Face-to-face** YES
	2. **Distance/Online** No
		1. **If yes, indicate mode of distance delivery, and the percentage of courses offered via this modality (<50%, 50-99%, or 100%).**

Enter text...

* + 1. **If online, will it be offered through Global Initiatives/Academic Partnerships (AP)?**

Enter text...

1. **Will the proposed degree be offered off-campus?** YES
	1. **If yes, identify the off-campus location**

 ASUCQ

1. **Provide documentation that proposed program has received full approval by licensure/certification entity, if required.**

 *(A program offered for teacher/education administrator licensure must be reviewed/approved by the Arkansas Department of Education prior to consideration by the Coordinating Board; therefore, the Education Protocol Form also must be submitted to ADHE along with the Letter of Notification).*

NA

1. **List institutions offering similar program and identify the institutions used as a model to develop the proposed program.**

University of Louisiana –Monroe, Appalachian State University, Middle Tennessee State University,

1. **Provide scheduled program review or specialized accreditation initial review date (within 10 years of program implementation).**

Fall 2032

1. **Is there differential tuition requested?** *If yes, please fill out the New Program/Tuition and Fees Change Form.*

YES

1. **Graduate programs only: Will this program require a comprehensive exam?**

NA

**Student Learning Outcomes**

Provide outcomes that students will accomplish during or at completion of this reconfigured degree. Fill out the following table to develop a 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.*

**University Outcomes**

Please indicate the university-level student learning outcomes for which this new program will contribute. Please complete the table by adding program level outcomes (PLO) to the first column, and indicating the alignment with the university learning outcomes (ULO). If you need more information about the ULOs, go to the [University Level Outcomes Website](http://www.astate.edu/a/assessment/student-learning-outcomes/files/ULOs%20for%20Website2.pdf).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **ULO 1: Creative & Critical Thinking** | **ULO 2: Effective Communication** | **ULO 3: Civic & Social Responsibility** | **ULO 4: Globalization & Diversity** |
| **PLO 1:** Identify and utilize the appropriate mathematical and statistical tools to model and solve a variety of problems in actuarial science. | **X** |  |  |  |
| **PLO 2:** Demonstrate communication, leadership, and collaboration skills and recognize their importance in the actuarial industry |  | **X** |  |  |
| **PLO 3:** Demonstrate understanding of the concepts, corresponding theories, and applications related to the areas of mathematics, statistics, finance, economics, and accounting. | **X** |  |  |  |
| **PLO 4:** Students will demonstrate up-to-date skills of computer and statistical programing software related to Actuarial Science. |  |  |  |  |
| **PLO 5:** Students will design and evaluate models that measure the impact of identified risks |  |  |  |  |

***Note: Best practices suggest 4-7 outcomes per program; minors would have 1 to 4 outcomes.***

|  |  |
| --- | --- |
| **Outcome 1** | Identify and utilize the appropriate mathematical and statistical tools to model and solve a variety of problems in actuarial science. |
| Assessment Procedure Criterion | Actuarial Exams FM and P – direct measureProgram exit survey developed by the faculty – indirect measure |
| Which courses are responsible for this outcome? | STAT 3233STAT 4443STAT 4453STAT 4463STAT 4483MATH 4403MATH 4573FIN 3723 |
| Assessment Timetable | The outcome will be reviewed assessed in year 4 and then it will be assessed and reviewed annually.  |
| Who is responsible for assessing and reporting on the results? | The program director in collaboration with the department chair will assess, analyze and report the results of the program assessment.  |

|  |  |
| --- | --- |
| **Outcome 2** | Demonstrate communication, leadership, and collaboration skills and recognize their importance in the actuarial industry |
| Assessment Procedure Criterion | Course project completed in MATH 4573 – direct measureProgram exit survey developed by the faculty – indirect measure |
| Which courses are responsible for this outcome? | MATH 4573 |
| Assessment Timetable | The outcome will be reviewed assessed in year 4 and then it will be assessed and reviewed annually.  |
| Who is responsible for assessing and reporting on the results? | The program director in collaboration with the department chair will assess, analyze and report the results of the program assessment.  |

|  |  |
| --- | --- |
| **Outcome 3** | Demonstrate understanding of the concepts, corresponding theories, and applications related to the areas of mathematics, statistics, finance, economics, and accounting. |
| Assessment Procedure Criterion | Actuarial Exams FM and P – direct measureProgram exit survey developed by the faculty – indirect measure |
| Which courses are responsible for this outcome? | All courses listed in major requirements |
| Assessment Timetable | The outcome will be reviewed assessed in year 4 and then it will be assessed and reviewed annually.  |
| Who is responsible for assessing and reporting on the results? | The program director in collaboration with the department chair will assess, analyze and report the results of the program assessment.  |

|  |  |
| --- | --- |
| **Outcome 4** | Students will demonstrate up-to-date skills of computer and statistical programing software related to Actuarial Science. |
| Assessment Procedure Criterion | Course project completed in MATH 4573 – direct measureProgram exit survey developed by the faculty – indirect measure |
| Which courses are responsible for this outcome? | STAT 4483ISBA 2033MATH 4753 |
| Assessment Timetable | The outcome will be reviewed assessed in year 4 and then it will be assessed and reviewed annually.  |
| Who is responsible for assessing and reporting on the results? | The program director in collaboration with the department chair will assess, analyze and report the results of the program assessment.  |

*Please repeat as necessary.*

|  |  |
| --- | --- |
| **Outcome 5** | Students will design and evaluate models that measure the impact of identified risks |
| Assessment Procedure Criterion | Course project completed in MATH 4573 – direct measureProgram exit survey developed by the faculty – indirect measure |
| Which courses are responsible for this outcome? | FIN 3773REI 3513MATH 4573 |
| Assessment Timetable | The outcome will be reviewed assessed in year 4 and then it will be assessed and reviewed annually.  |
| Who is responsible for assessing and reporting on the results? | The program director in collaboration with the department chair will assess, analyze and report the results of the program assessment.  |

**Appendix A, 8-Semester Plan**

(**Referenced in #9** - **Undergraduate Proposals Only)**

*Instructions: Please identify new courses in italics*.

|  |
| --- |
| **Arkansas State University-Jonesboro****Degree: Bachelor of Science** **Major: Actuarial Science****Year: 2022-2023** |
| Students requiring developmental course work based on low entrance exam scores (ACT, SAT, ASSET, COMPASS) may not be able to complete this program of study in eight (8) semesters. Developmental courses do not count toward total degree hours. **Students having completed college level courses prior to enrollment will be assisted by their advisor in making appropriate substitutions. In most cases, general education courses may be interchanged between semesters.** A minimum of 45 hours of upper division credit (3000-4000 level) is required for this degree. |
| **Year 1** |  | **Year 1** |
| **Fall Semester** |  | **Spring Semester** |
| **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |  | **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |
| MATH 1093 | Making Connections | 3 |  |  | MATH 2214 | Calculus II | 4 |  |
| MATH 2204 | Calculus I | 4 | X |  | ENG 1013 | Composition II | 3 | X |
| ENG 1003 | Composition I | 3 | X |  |  ENG 2003 or ENG 2013ENG 2013 orPHIL 1103 | Intro to World Lit I or World Literature Since 1660Intro to World Lit II orIntro to Philosophy | 3 | X |
|  MUS 2503 or THEA 2503 or ART 2503 | Fine Arts-Musical or Fine Arts-Theatre or Fine Arts -Visual | 3 | X |   |  COMS 1203 | Oral Communication | 3 | X |
|  HIST 2763 or HIST 2773 orPOSC 2103 | U.S. to 1876 orU.S. since 1876 orIntro to U.S. Gov’t | 3 | X |  |  ECON 2313 | Principles of Macroecon | 3 | X |
|  |  |  |  |  |  |  |  |  |
| **Total Hours** |  | 16 |  |  | **Total Hours** |  | 16 |  |
| **Year 2** |  | **Year 2** |
| **Fall Semester** |  | **Spring Semester** |
| **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |  | **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |
| MATH 3254 | Calculus III | 4 |  |  | MATH 4403 | Differential Equations | 3 |  |
| ACCT 2033 | Intro to Financial Accounting | 3 |  |  | ACCT 2133 | Intro to Managerial Accounting | 3 |  |
| Life Science | BIO with LAB | 4 | X |  | PHYS 2034 orPHYS 2054 | University Physics IGeneral Physics I | 4 | X |
| ISBA 2033 | Programming Fundamentals | 3 |  |  | ECON 2323 | Principles of Microeconomics | 3 | X |
|  | Elective | 1 |  |  | STAT 3233 | Applied Stat I | 3 |  |
|  |  |  |  |  |  |  |  |  |
| **Total Hours** |  | 15 |  |  | **Total Hours** |  | 16 |  |
| **Year 3** |  | **Year 3** |
| **Fall Semester** |  | **Spring Semester** |
| **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |  | **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |
|  | Elective | 3 |  |  | *STAT 4443* | *Stochastic Processes* | *3* |  |
| FIN 3713 | Business Finance | 3 |  |  | MATH 3243 | Linear Algebra | 3 |  |
| REI 3513 | Risk and Insurance | 3 |  |  | FIN 3723 | Financial Analytics & Modeling | 3 |  |
| STAT 4483  | Statistical Methods Using R  | 3 |  |  |  | Elective  | 3 |  |
| ISBA 3413ISBA 3423 orISBA 3663 | Big Data for BusinessData visualization for BusinessData Mining for Business | 3 |  |  | ISBA 3413ISBA 3423 orISBA 3663 | Big Data for BusinessData visualization for BusinessData Mining for Business | 3 |  |
|  |  |  |  |  |  |  |  |  |
| **Total Hours** |  | 15 |  |  | **Total Hours** |  | 15 |  |
| **Year 4** |  | **Year 4** |
| **Fall Semester** |  | **Spring Semester** |
| **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |  | **Course No.** | **Course Name** | **Hrs** | **Gen Ed** |
| FIN 3773 | Financial Risk Management | 3 |  |  | STAT 4463 | Probability and Statistics II | 3 |  |
| STAT 4453 | Probability and Statistics I | 3 |  |  | *MATH 4573* | *Actuarial Science Seminar* | 3 |  |
| REI 4513 orREI 4543 | Property and LiabilityLife InsuranceLife Insurance | 3 |  |  | FIN 4723 | Investments | 3 |  |
|  | Elective | 3 |  |  |  | Elective | 3 |  |
|  | Elective | 3 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **Total Hours** |  | 15 |  |  | **Total Hours** |  | 12 |  |
| **Total Jr/Sr Hours \_\_51\_ Total Degree Hours \_\_120\_** |
| **Graduation Requirements:** |

RED – Department of Mathematics & Statistics

BLUE – Department of Economics & Finance

Green – Department of Information Systems & Business Analytics

Purple – Department of Accounting

**Bulletin Changes**

|  |
| --- |
| **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. Please include a before (with changed areas highlighted) and after of all affected sections.** **\*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.**  |

Paste bulletin pages here...

**From the 2021-2022 undergraduate catalog**

**Page 68 Before:**

**Bachelor of Science (B.S.)**

|  |
| --- |
| Accounting |
| Biological Sciences (emphasis in):—Biology—Botany—Pre-professional Studies—Zoology |
| Biotechnology |
| Business Administration—Sustainable Business Practices |
| Business Economics |
| Chemistry:—Pre-Health Profession Studies |
| Clinical Laboratory Science |
| Communication Disorders |
| Information Systems and Business Analytics |
| Computer Science |
| Creative Media Production (emphasis in):—Corporate Media—Graphic Communication—Sports Media |
| Data Science and Data Analytics |
| Dietetics |

**Page 68 After:**

**Bachelor of Science (B.S.)**

|  |
| --- |
| AccountingActuarial Science |
| Biological Sciences (emphasis in):—Biology—Botany—Pre-professional Studies—Zoology |
| Biotechnology |
| Business Administration—Sustainable Business Practices |
| Business Economics |
| Chemistry:—Pre-Health Profession Studies |
| Clinical Laboratory Science |
| Communication Disorders |
| Information Systems and Business Analytics |
| Computer Science |
| Creative Media Production (emphasis in):—Corporate Media—Graphic Communication—Sports Media |
| Data Science and Data Analytics |
| Dietetics |

Page 441 Before:

Major in Mathematics

**Bachelor of Science**

A complete 8-semester degree plan is available at [https://www.astate.edu/info/academics/degrees/](http://www.astate.edu/info/academics/degrees/)

|  |  |
| --- | --- |
| **University Requirements:** |  |
| See University General Requirements for Baccalaureate degrees (p. 47) |  |
| **First Year Making Connections Course:** | **Sem. Hrs.** |
| MATH 1093, Making Connections - Mathematics | **3** |
| **General Education Requirements:** | **Sem. Hrs.** |
| See General Education Curriculum for Baccalaureate degrees (p. 84)**Students with this major must take the following:***MATH 2204, Calculus I**PHYS 2034, University Physics I**Twelve hours in Social Sciences (Required Departmental Gen. Ed. Option), including one of the following:**ANTH 2233, Introduction to Cultural Anthropology GEOG 2613, Introduction to Geography**HIST 1013, World History to 1500**HIST 1023, World History since 1500* | **36** |
| **Major Requirements:** | **Sem. Hrs.** |
| CS 2114, Structured Programming | 4 |
| MATH 2183, Discrete Structures | 3 |
| MATH 2214, Calculus II | 4 |
| MATH 3254, Calculus III | 4 |
| MATH 3243, Linear Algebra | 3 |
| MATH 3303, Modern Algebra I | 3 |
| MATH 4403, Differential Equations | 3 |
| MATH 4553, Advanced Calculus I | 3 |
| PHYS 2044, University Physics II | 4 |
| STAT 3233, Applied Statistics I | 3 |
| STAT 4453, Probability and Statistics I | 3 |
| **Select one of the following:**MATH 4423, Modern Algebra II MATH 4563, Advanced Calculus IISTAT 4463, Probability and Statistics II | 3 |
| **Mathematics or Statistics Electives (select four of the following):**MATH 3273, Applied Complex Analysis MATH 3323, Mathematical Modeling MATH 3343, College GeometryMATH 3353, History of Mathematics MATH 4413, Partial Differential Equations MATH 4423, Modern Algebra II*If not taken to satisfy Major Requirements*MATH 4513, Applied Mathematics MATH 4533, Numerical Methods MATH 4563, Advanced Calculus II*If not taken to satisfy Major Requirements* STAT 4483, Statistical Methods Using R STAT 4463. Probability and Statistics II*If not taken to satisfy Major Requirements* | 12 |
| **Sub-total** | **52** |
| **Electives:** | **Sem. Hrs.** |
| Electives (Eight hours must be upper-level) | **29** |
| **Total Required Hours:** | **120** |

**Page 441 After:**

Major in Actuarial Science

Bachelor of Science

A complete 8-semester degree plan is available at [https://www.astate.edu/info/academics/degrees/](http://www.astate.edu/info/academics/degrees/)

|  |  |
| --- | --- |
| **University Requirements:** |  |
| See University General Requirements for Baccalaureate degrees (p. 47) |  |
| **First Year Making Connections Course:** | **Sem. Hrs.** |
| MATH 1093, Making Connections - Mathematics | **3** |
| **General Education Requirements:** | **Sem. Hrs.** |
| See General Education Curriculum for Baccalaureate degrees (p. 84)**Students with this major must take the following:***MATH 2204, Calculus I**PHYS 2034, University Physics I* ***OR****PHYS 2054, General Physics I**COMS 1203, Oral Communication* *ECON 2313, Principles of Macroeconomics**ECON 2323, Principles of Microeconomics* | **36** |
| **Major Requirements:** | **Sem. Hrs.** |
| ACCT 2033, Introduction to Financial Accounting | 3 |
| ACCT 2133, Introduction to Managerial Accounting | 3 |
| FIN 3713, Business Finance | 3 |
| FIN 3723, Financial Analytics and Modeling | 3 |
| FIN 3773, Financial Risk Management | 3 |
| FIN 4723, Investments | 3 |
| ISBA 2033, Programming Fundamentals | 3 |
| MATH 2214, Calculus II | 4 |
| MATH 3243, Linear Algebra | 3 |
| MATH 3254, Calculus III | 4 |
| MATH 4403, Differential Equations | 3 |
| MATH 4573, Actuarial Science Seminar | 3 |
| REI 3513 Risk and Insurance | 3 |
| STAT 3233, Applied Statistics I | 3 |
| STAT 4443, Stochastic Processes | 3 |
| STAT 4453, Probability and Statistics I | 3 |
| STAT 4463, Probability and Statistics II | 3 |
| STAT 4483, Statistical Methods Using R | 3 |
| **Select two of the following:**ISBA 3413, Big Data for BusinessISBA 3423, Data visualization for BusinessISBA 3663, Data Mining for Business | 6 |
| **Select one of the following:**REI 4513, Property and Liability InsuranceREI 4543, Life Insurance | 3 |
| **Sub-total** | **65** |
| **Electives:** | **Sem. Hrs.** |
| Electives | **16** |
| **Total Required Hours:** | **120** |
|  |  |
|  |  |

Major in Mathematics

**Bachelor of Science**

A complete 8-semester degree plan is available at [https://www.astate.edu/info/academics/degrees/](http://www.astate.edu/info/academics/degrees/)

|  |  |
| --- | --- |
| **University Requirements:** |  |
| See University General Requirements for Baccalaureate degrees (p. 47) |  |
| **First Year Making Connections Course:** | **Sem. Hrs.** |
| MATH 1093, Making Connections - Mathematics | **3** |
| **General Education Requirements:** | **Sem. Hrs.** |
| See General Education Curriculum for Baccalaureate degrees (p. 84)**Students with this major must take the following:***MATH 2204, Calculus I**PHYS 2034, University Physics I**Twelve hours in Social Sciences (Required Departmental Gen. Ed. Option), including one of the following:**ANTH 2233, Introduction to Cultural Anthropology GEOG 2613, Introduction to Geography**HIST 1013, World History to 1500**HIST 1023, World History since 1500* | **36** |
| **Major Requirements:** | **Sem. Hrs.** |
| CS 2114, Structured Programming | 4 |
| MATH 2183, Discrete Structures | 3 |
| MATH 2214, Calculus II | 4 |
| MATH 3254, Calculus III | 4 |
| MATH 3243, Linear Algebra | 3 |
| MATH 3303, Modern Algebra I | 3 |
| MATH 4403, Differential Equations | 3 |
| MATH 4553, Advanced Calculus I | 3 |
| PHYS 2044, University Physics II | 4 |
| STAT 3233, Applied Statistics I | 3 |
| STAT 4453, Probability and Statistics I | 3 |
| **Select one of the following:**MATH 4423, Modern Algebra II MATH 4563, Advanced Calculus IISTAT 4463, Probability and Statistics II | 3 |
| **Mathematics or Statistics Electives (select four of the following):**MATH 3273, Applied Complex Analysis MATH 3323, Mathematical Modeling MATH 3343, College GeometryMATH 3353, History of Mathematics MATH 4413, Partial Differential Equations MATH 4423, Modern Algebra II*If not taken to satisfy Major Requirements*MATH 4513, Applied Mathematics MATH 4533, Numerical Methods MATH 4563, Advanced Calculus II*If not taken to satisfy Major Requirements* STAT 4483, Statistical Methods Using R STAT 4463. Probability and Statistics II*If not taken to satisfy Major Requirements* | 12 |
| **Sub-total** | **52** |
| **Electives:** | **Sem. Hrs.** |
| Electives (Eight hours must be upper-level) | **29** |
| **Total Required Hours:** | **120** |

**Page 542 Before:**

**MATH 4553. Advanced Calculus I** The theoretical treatment of calculus of one real vari­able. Limits, continuity, sequences, differentiation and integration. Prerequisite, MATH 3254. Fall.

**MATH 4563. Advanced Calculus II** Continuation of MATH 4553. Prerequisite, MATH 4553. Spring.

**MATH 4581. Mathematics Seminar** Prerequisite, MATH 3303. Fall, Spring.

**MATH 459V. Special Problems in Mathematics** Prerequisite, MATH 3303. Fall, Spring.

**Page 542 After:**

**MATH 4553. Advanced Calculus I** The theoretical treatment of calculus of one real vari­able. Limits, continuity, sequences, differentiation and integration. Prerequisite, MATH 3254. Fall.

**MATH 4563. Advanced Calculus II** Continuation of MATH 4553. Prerequisite, MATH 4553. Spring.

MATH 4573. Actuarial Science Seminar A course designed to prepare students for making transition from academic courses to actuarial practice. Students study actuarial problems through real applications in projects using software. Students are also prepared to register for two Society of Actuaries professional exams. Prerequisites, Senior standing and consent of instructor. Fall, Spring.

**MATH 4581. Mathematics Seminar** Prerequisite, MATH 3303. Fall, Spring.

**MATH 459V. Special Problems in Mathematics** Prerequisite, MATH 3303. Fall, Spring.

**Page 608 Before:**

**STAT 3243. Regression Analysis and Analysis of Variance (ANOVA)** Theory and practice of regression analysis and ANOVA. Introduction of simple and multiple linear regression, inferences about model parameters, regression diagnostics, variable selection, and model adequacy check­ing and regression approaches to ANOVA. Prerequisite, STAT 3233. Spring.

**STAT 4453. Probability and Statistics I** Set theory, random variables, probability laws and distributions, independence, conditioning, moment generating functions and the Central Limit Theorem. Prerequisite, MATH 3254. Fall.

**STAT 4463. Probability and Statistics II** Point and interval estimation, hypothesis testing, ANOVA, correlation, regression, and nonparametric methods. Prerequisite, STAT 4453. Spring.

**STAT 4473. Applied Statistics II** A second course in applied statistics covering topics in statistical inference for comparing population means and proportions, power, and sample size analyses, analysis of variance, ANOVA, and multiple comparisons procedures, nonparametric statistical procedures, chi square analyses, and inference for regression. Prerequisite, STAT 3233 or equivalent. Spring.

**STAT 4483. Statistical Methods Using R** Introduction to the statistical software package R and how to use it to run hypothesis tests involving means, variances, and proportions, linear regres­sion, ANOVA, and nonparametric statistics. Prerequisite, STAT 4463 or STAT 4473. Fall, odd.

**Page 608 After:**

**STAT 3243. Regression Analysis and Analysis of Variance (ANOVA)** Theory and practice of regression analysis and ANOVA. Introduction of simple and multiple linear regression, inferences about model parameters, regression diagnostics, variable selection, and model adequacy check­ing and regression approaches to ANOVA. Prerequisite, STAT 3233. Spring.

STAT 4443. Stochastic Processes An introduction to stochastic processes featuring random walks, Markov chains, Poisson processes, martingales, time series, and Brownian motion. Prerequisite, STAT 3233. Spring.

**STAT 4453. Probability and Statistics I** Set theory, random variables, probability laws and distributions, independence, conditioning, moment generating functions and the Central Limit Theorem. Prerequisite, MATH 3254. Fall.

**STAT 4463. Probability and Statistics II** Point and interval estimation, hypothesis testing, ANOVA, correlation, regression, and nonparametric methods. Prerequisite, STAT 4453. Spring.

**STAT 4473. Applied Statistics II** A second course in applied statistics covering topics in statistical inference for comparing population means and proportions, power, and sample size analyses, analysis of variance, ANOVA, and multiple comparisons procedures, nonparametric statistical procedures, chi square analyses, and inference for regression. Prerequisite, STAT 3233 or equivalent. Spring.

**STAT 4483. Statistical Methods Using R** Introduction to the statistical software package R and how to use it to run hypothesis tests involving means, variances, and proportions, linear regres­sion, ANOVA, and nonparametric statistics. Prerequisite, STAT 4463 or STAT 4473. Fall, odd.