ACTUARIAL SCIENCE (CAS)

Description
Website: business.unl.edu/academic-programs/departments/finance/actuarial-science (http://business.unl.edu/academic-programs/departments/finance/actuarial-science)

An actuary is a mathematically-oriented business person who will most likely be a manager or supervisor at some point in his/her career. A course of study culminating in a bachelor of science degree with a major in actuarial science is an excellent educational background for prospective actuaries.

The actuarial science program is designed to prepare students for the current industry demands. Because the demands change on a regular basis, often times, the number of hours, the sequencing of courses, and the specific requirements change for this major. Students should continue to consult with the department for the appropriate selection and listing of course requirements.

All actuarial science students are encouraged to visit the actuarial science program’s website and an actuarial science program faculty advisor for more information about the program, including the Actuarial Science Club, sequencing of courses, scholarship opportunities, and the requirements for achieving professional actuarial designations.

College Requirements
College Admission

College Admission
The entrance requirements for the College of Arts and Sciences are the same as the University of Nebraska–Lincoln General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at Nebraska. These conditions are explained under “Removal of Deficiencies.”

In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of one foreign language. Four years of high school course work in the same language will fulfill the College of Arts and Sciences’ language requirement. It will also allow students to continue language study at a more advanced level at the University of Nebraska–Lincoln, and provide more opportunity to study abroad.

Transfer Students
To be considered for admission as a transfer student, Nebraska resident or nonresident, students must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who graduated from high school January 1997 and after must also meet the University of Nebraska–Lincoln General Admission Requirements. Those transfer students who graduated before January 1997 must have completed in high school, 3 years of English, 2 years of the same foreign language, 2 years of algebra, and 1 year of geometry. Transfer students who have completed less than 12 credit hours of college study must also submit either their ACT or SAT scores.

Ordinarily, hours earned at a similarly accredited college or university are applicable to the University of Nebraska–Lincoln degree. The College, however, will evaluate all hours submitted on an application for transfer, and reserves the right to accept or reject any of them, based upon its exclusion and restriction policies. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college or international institution. Transfer credit in the major or minor must be approved by the departmental advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major or minor. At least half of the hours in the major field must be completed at the University regardless of the number of hours transferred.

The College of Arts and Sciences will accept no more than 15 semester hours of C- and D grades from other schools. The C- and D grades cannot be applied toward requirements for a major or minor. This policy does not apply to the transfer of grades from UNO or UNK to the University of Nebraska–Lincoln. All D grades may be transferred from UNO or UNK, but they are not applicable to a major or minor.

Readmitted Students
University of Nebraska–Lincoln students who choose not to take courses for more than two consecutive terms, must reapply to the University of Nebraska–Lincoln. Students readmitted to the College of Arts and Sciences will follow the requirements stated in the catalog for the academic year of readmission and re-enrollment as a degree-seeking student in Arts and Sciences. In consultation with advisors, a student may choose to follow a catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990–1991, the catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Admission Deficiencies/Removal of Deficiencies
Students must remove entrance deficiencies in geometry and foreign language as soon as possible, and before graduating from the College of Arts and Sciences. For questions and more information, students should consult a college advisor in the Academic and Career Advising Center in 107 Oldfather Hall.

Removing Foreign Language Deficiencies
Students must complete the second semester of a first year language sequence to clear the deficiency and the second semester of the second year language sequence to complete the college graduation requirement in language.

Removing Geometry Deficiencies
A deficiency of one year of geometry can be removed by taking high school geometry courses through an approved independent study program, or by completing a geometry course from an accredited community college or a four-year institution. Neither of these options will count for college credit.

College Degree Requirements

College Distribution Requirements

Bachelor of Arts or Bachelor of Science (16 hours + Language)
The College of Arts and Sciences distribution requirements are designed to further the purposes of liberal education by encouraging study in several different areas within the College. All requirements are in addition to University ACE requirements. A student may not use a single course to satisfy more than one of the following five distribution requirements. A student cannot use a single course to satisfy both an ACE outcome and a College distribution requirement. A student cannot use a course from their primary major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their second major toward this requirement. Independent study or
reading courses and internships cannot be used to satisfy distribution requirements. To see a complete list of excluded courses, run a degree audit through MyRED.

Courses from interdisciplinary programs will count in the same area as courses from the home/cross-listed department(s).

**College Distribution Requirements**

<table>
<thead>
<tr>
<th>CDR A - Written Communication</th>
<th>3</th>
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<tbody>
<tr>
<td>Select from courses approved for ACE outcome 1.</td>
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<thead>
<tr>
<th>CDR B and BL - Natural, Physical, and Mathematical Sciences with Lab</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from biochemistry, biological sciences, chemistry, computer science, geology, meteorology, mathematics, physics and statistics. Must include one lab in the natural or physical sciences. Lab courses may be selected from biochemistry, biological sciences, chemistry, geology, meteorology and physics. Some courses from geography and anthropology may also be used to satisfy the lab requirement.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR C - Humanities</th>
<th>3</th>
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<tbody>
<tr>
<td>Select from classics, English, history, modern languages and literatures, philosophy, and religious studies.</td>
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<thead>
<tr>
<th>CDR D - Social Science</th>
<th>3</th>
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<tbody>
<tr>
<td>Select from: anthropology, communication studies, geography, political science, psychology, or sociology.</td>
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<tr>
<th>CDR E - Language</th>
<th>0-16</th>
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<tbody>
<tr>
<td>Fulfilled by the completion of the 6-credit-hour second-year sequence in a single foreign language in one of the following departments: Classics and religious studies, modern languages and literatures, or anthropology. Instruction is currently available in Arabic, Chinese, Czech, French, German, Greek, Japanese, Latin, Omaha, Russian, and Spanish. A student who has completed the fourth-year level of one foreign language in high school is exempt from the languages requirement.</td>
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<tr>
<th>CDR F - Additional Breadth</th>
<th>3</th>
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<tbody>
<tr>
<td>Select from: natural, physical and mathematical sciences (Area B), humanities (Area C), or social sciences (Area D). Cannot be a course from the primary major.</td>
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</table>

Credit Hours Subtotal: 16-32

1. See degree audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.

2. Language courses numbered 210 or below apply only for the foreign language requirement.

3. See degree audit or College of Arts and Sciences advisor for list of natural/physical science courses in anthropology, geography, and psychology that do not apply as social science.

**Scientific Base**

**Bachelor of Science Only (60 hours)**
The bachelor of science degree requires students to complete 60 hours in mathematical, physical and natural sciences. Approved courses for scientific base credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIOC 101), biological sciences (excluding BIOS 203), chemistry (excluding CHEM 101), computer science (excluding CSCE 10), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104), meteorology, microbiology, physics and statistics.

See your degree audit or a College of Arts and Sciences advisor for a complete list including individual classes that fall outside of the disciplines listed above. Up to 12 hours of scientific and technical courses offered by other colleges may be accepted toward this requirement with approval of a college advisor.

**Foreign Languages/Language Requirement**

**Languages Exemption Policy**
The University of Nebraska–Lincoln and the College of Arts and Sciences will exempt or waive students from the Nebraska entrance requirement of two years of the same foreign language or from the College’s language distribution requirement based on documentation only. The following are the options and procedures for documentation:

**High School Transcripts**

For the University entrance requirement, students must show an official high school transcript with two or more years of the same foreign language.

For the College of Arts and Sciences College Distribution Requirement E-Language, students must show an official high school transcript with four or more years of the same foreign language in high school, or show evidence of graduation from a non-English-speaking foreign high school. Students whose native language is not English must show English as a Second Language study on an official high school transcript. Four years of ESL at the high school level (9th, 10th, 11th and 12th grades) will be the basis for a waiver of the CDR E Language requirement.

**Proficiency Examination at UNL**

For the University entrance requirement, students who do not have transcript documentation can request to take a proficiency exam in the language. (This is not the same test as the Modern Languages Placement Exam.) However, the University will provide testing only in the languages it teaches. Currently, these languages are: Arabic, French, German, Spanish, Russian, Czech, Japanese, Chinese.

For the College of Arts and Sciences College Distribution Requirement E-Language, the Department of Modern Languages will oversee the test at the 202 level. If the student passes the test, the department will sign the College Request for Waiver form and indicate the level of proficiency. The form is then forwarded to the Arts and Sciences Advising Center for approval.

The Department of Modern Languages will oversee the test and provide written documentation to the Arts and Sciences Advising Center the level of proficiency passed.

**Distance Education**

For the University entrance requirement, students without transcript documentation who claim proficiency in a language not taught at the University of Nebraska–Lincoln, have the option of seeking out a distance education program in languages. If the student completes the equivalent of 102 from an approved distance education program, the student will meet the University’s entrance requirement. The student must have the course work approved before he/she takes/completes the course as equivalent to 102 by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

For the College of Arts and Sciences College Distribution Requirement E-Language, the student can seek out a distance education program and complete the equivalent of the 202-level course. The student must submit
the request on the College Request for Substitution form and have the course work approved by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

**Third Language Option**
If a student demonstrates knowledge of two foreign languages at the 102 level, the College of Arts and Sciences may consider waiving two semesters of the four semester College Distribution Requirement E-Languages requirement. If this waiver were granted, the student would then be required to complete 101 and 102 in another, 3rd foreign language at Nebraska.

**Minimum Hours Required for Graduation**
A minimum of 120 semester hours of credit is required for graduation from the College of Arts and Sciences. A total grade point average of at least 2.0 is required.

**Grade Rules**

**Restrictions on C- and D Grades**
The College will accept no more than 15 semester hours of C- and D grades from other schools except for UNO and UNK. No transfer C- and D grades can be applied toward requirements in a major or a minor. No University of Nebraska–Lincoln C- and D grades can be applied toward requirements in a major or a minor.

**Pass/No Pass Privilege**

**University regulations for the Pass/No Pass (P/N) privilege state:**

- The Pass/No Pass option is designed for your use by seeking to expand your intellectual horizons by taking courses in areas where you may have had minimal preparation.
- Neither the P nor the N grade contribute to your GPA.
- P is interpreted to mean C or above.
- A change to or from a Pass/No Pass may be made until mid-term (see academic calendar for specific dates per term).
- The Pass/No Pass or grade registration cannot conflict with the policy of the professor, department, college, or University governing the grading option.
- Changing to or from Pass/No Pass requires using the MyRED system to change the grading option or filing a Drop/Add form with the Office of the University Registrar, 107 Canfield Administration Building. After mid-term of the course, a student registered for Pass/No Pass cannot change to a grade registration unless the Pass/No Pass registration is in conflict with the policy of the professor, department, college, or University governing Pass/No Pass.
- The Pass/No Pass grading option cannot be used for the removal of C- or D or F grades.

**Pass/No Pass privileges in the College of Arts and Sciences are extended to students according to the following additional regulations:**

- Pass/No Pass hours can count toward fulfillment of University ACE requirements and college distribution requirements up to the 24-hour maximum.
- Most Arts and Sciences departments and programs do not allow courses graded Pass/No Pass to apply to the major or minor. Students should refer to the department’s or program’s section of the catalog for clarification. By college rule, departments can allow up to 6 hours of Pass/No Pass in the major or minor.
- Departments may specify that certain courses of theirs can be taken only on a P/N basis.
- The college will permit no more than a total of 24 semester hours of P/N grades to be applied toward degree requirements. This total includes all Pass grades earned at the University and other U.S. schools. **NOTE:** This 24-hour limit is more restrictive than the University regulation.

**Grading Appeals**
A student who feels that he/she has been unfairly graded must ordinarily take the following sequential steps in a timely manner, usually by initiating the appeal in the semester following the awarding of the grade:

1. Talk with the instructor concerned. Most problems are resolved at this point.
2. Talk to the instructor’s department chairperson.
3. Take the case to the Grading Appeal Committee of the department concerned. The Committee should be contacted through the department chairperson.
4. Take the case to the College Grading Appeals Committee by contacting the Dean’s Office, 1223 Oldfather Hall.

**Course Level Requirements**

**Courses Numbered above 299**
Thirty of the 120 semester hours of credit must be in courses numbered above 299. Of the 30 hours above 299, 15 hours (1/2) must be completed in residence at UNL.

**Graduate Courses**
Seniors in the University who have obtained in advance the approval of the dean for Graduate Studies may receive up to 12 hours credit for graduate courses taken in addition to the courses necessary to complete their undergraduate work, provided that such credits are earned within the calendar year prior to receipt of the baccalaureate. For procedures, inquire at the Office of Graduate Studies.

Course work taken prior to receipt of the baccalaureate may not always be accepted for transfer to other institutions as graduate work.

**Residency**

**Residency Requirement and Open Enrollment and Summer Independent Study Courses**
Students must complete at least 30 of the 120 total hours for their degree at the University of Nebraska—Lincoln. Students must complete at least 1/2 of their major course work including 6 hours above 299 in their major, and 15 of the 30 hours required above 299 in residence. Credit earned during education abroad may be used toward the residency requirement if students register through the University and participate in prior-approved education abroad programs. The University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

**ACE Requirements**
Consistent with the mission and values of the University, ACE is based on a shared set of four institutional objectives and ten student learning outcomes. The ACE program was approved by faculty in all eight undergraduate colleges and endorsed by the Faculty Senate, the student government, and the Academic Planning Committee in January 2008 for implementation in the fall 2009. ACE aligns with current national initiatives in general education.
Key characteristics of ACE demonstrate the benefits of the program to students:

- Students receive a broad education with exposure to multiple disciplines, critical life skills and important reasoning, inquiry, and civic capacities.
- ACE is simple and transparent for students, faculty and advisors. Students complete the equivalent of 3 credit hours for each of the ten student learning outcomes.
- Students connect and integrate their ACE experiences with their selected major.
- Students can transfer all ACE certified courses across colleges within the institution to meet the ACE requirement and any course from outside the institution that is directly equivalent to a University of Nebraska–Lincoln ACE-certified course. Courses from outside institutions without direct equivalents may be considered with appropriate documentation for ACE credit (see academic advisor).

ACE allows faculty to assess and improve their effectiveness and facilitate students’ learning.

ACE Institutional Objectives and Student Learning Outcomes
To meet the ACE Program requirement, a student will complete a minimum of 3 credit hours for each of the ten ACE Student Learning Outcomes (a total of 30 ACE credit hours). See the ACE website at: http://ace.unl.edu for the most current information and the most recently certified courses.

Catalog Rule
Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to and enrolled as a degree-seeking student at the University of Nebraska–Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year.

Learning Outcomes
Majors in actuarial science will be able to:

1. Demonstrate the ability to apply the concept of actuarial science in solving problems related to financial security.
2. Understand the content of the UNL courses that have been approved for the actuarial profession's Validation by Educational Experience (VEE) program for the topics of Economics, Corporate Finance and Applied Statistics.
3. Understand the additional considerations in practical applications of actuarial theory, such as assumption setting, Actuarial Standards of Practice, the professional code of conduct, and effective communication.
4. Understand that being a professional requires that actuarial tasks be completed with the highest regard for personal and professional ethics.
5. Demonstrate the ability to transition from actuarial theory to actuarial practice, and the ability to apply tools that actuaries use in practice to complete actuarial tasks, such as a modern procedural computer programming language, EXCEL or similar spreadsheet program, and commercially available actuarial software.
6. Demonstrate the ability to communicate the results of quantitative analysis effectively, both in writing and orally.
7. Demonstrate the ability to work cooperatively with others.
8. Understand what is involved in being a member of the actuarial profession, including the types of employment available in an actuarial career, and the requirements to become, and remain, a member of the actuarial profession.
9. Demonstrate the ability to be productive in one or more actuarial roles including: a. current or developing areas of actuarial practice; b. research designed to deepen or broaden actuarial knowledge; or c. education of aspiring or practicing actuaries.

Major Requirements

Core Requirements

| Required Calculus Sequence | MATH 106 | Calculus I | 5 |
| MATH 107 | Calculus II | 4 |
| MATH 208 | Calculus III | 4 |
| Credit Hours Subtotal: | 13 |

Required Statistics and Probability Sequence

| STAT 380 | Statistics and Applications | 3 |
| STAT 462 | Introduction to Mathematical Statistics I: Distribution Theory | 4 |
| STAT 463 | Introduction to Mathematical Statistics II: Statistical Inference | 4 |
| Credit Hours Subtotal: | 11 |

Required Finance Course

| FINA 338 | Principles of Individual and Corporate Risk Management | 3 |
| Credit Hours Subtotal: | 3 |

Required Actuarial Science Courses

| ACTS 440 | Interest Theory | 4 |
| ACTS 470 | Life Contingencies I | 3 |
| ACTS 475 | Actuarial Applications in Practice | 3 |
| ACTS 95 | Actuarial Practicum | 0 |
| Credit Hours Subtotal: | 10 |
| Total Credit Hours: | 37 |

1. Students must complete STAT 462 before taking any 400-level actuarial science course except ACTS 440 and ACTS 441.
2. STAT 463 may be taken concurrently with ACTS 470.

Specific Major Requirements

Actuarial Science Courses

| Twelve (12) hours of additional courses to be selected from the list of courses below and in consultation with the faculty advisors. | 12 |
| ACTS 410 | Introduction to Credibility, Smoothing of Data, and Simulation |
| ACTS 425 | Survival Models |
| ACTS 430 | Actuarial Applications of Applied Statistics |
| ACTS 441 | Introduction to Financial Economics |
| ACTS 471 | Life Contingencies II |
| ACTS 473 | Introduction to Risk Theory |
### ACTS 474
Introduction to Property/Casualty Actuarial Science

<table>
<thead>
<tr>
<th>FINA 467A</th>
<th>Options, Futures and Derivative Securities for Actuarial Science</th>
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<table>
<thead>
<tr>
<th>Credit Hours Subtotal:</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit Hours:</td>
<td>12</td>
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</table>

ACTS 399, ACTS 401, ACTS 402, ACTS 403, ACTS 404, and ACTS 405 do not count toward the 12 additional hours, but may be recommended by the faculty advisors.

### Additional Major Requirements

#### Grade Rules

**C- and D Grades**
A grade of C or above is required for all courses in the major and minor.

**Pass/No Pass**
No course taken Pass/No Pass will be counted toward the major or minor.

### Requirements for Minor Offered By Department

At least thirteen (13) hours of actuarial science as indicated below, plus prerequisite courses (MATH 106, MATH 107, MATH 208, and STAT 380, STAT 462, and STAT 463).

#### Required Courses

| ACTS 440 | Interest Theory | 4 |
| ACTS 470 | Life Contingencies I | 3 |
| ACTS 475 | Actuarial Applications in Practice | 3 |
| One additional ACTS course | 3 |
| Credit Hours Subtotal: | 13 |
| Total Credit Hours: | 13 |

### Grade Rules

**C- and D Grades**
A grade of C or above is required for all courses in the major and minor.

**Pass/No Pass**
No course taken Pass/No Pass will be counted toward the major or minor.

**ACTS 399 Independent Study**

**Prerequisites:** Permission.

**Credit Hours:** 1-3
**Min credits per semester:** 1
**Max credits per semester:** 3
**Max credits per degree:** 24
**Format:** IND

**ACTS 401 Problem Lab: Basic Actuarial Applications of Probability**

**Prerequisites:** MATH 208 or 208H and STAT 462, or parallel, and both with a grade of "Pass" or "C" or better.

**Description:** Calculus-based probability, both univariate and multivariate, applications to risk management-related problems. Problems as posed in the Society of Actuaries (SOA) Exam "P" and/or Casualty Actuarial Society (CAS) Exam "1". Determination of loss frequency distributions and their characteristics, expected value, variance, and percentiles. Determination of loss severity distributions and their characteristics, expected value, variance, and percentiles. Determination of loss sharing parameters, deductibles, and maximum payments.

**Credit Hours:** 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Format:** LAB

**ACTS 402 Problem Lab: Basic Actuarial Applications of Financial Mathematics**

**Prerequisites:** ACTS 440/840 or parallel

**Description:** Application of basic mathematics of finance to problems involving valuation of financial transactions. Problems as posed in the "Society of Actuaries (SOA) Exam "FM"" and/or "Casualty Actuarial Society (CAS) Exam "2". Determining equivalent measures of interest; estimating the rate of return on a fund; discounting or accumulating a sequence of payments with interest; determining yield rate; length of investment; amounts of investment contributions or amounts of investment returns for various types of financial transactions; and basic calculations involving yield curves, spot rates, forward rates, duration, convexity, immunization and short sales; introduction to financial derivatives (forwards, options, futures, and swaps) and their use in risk management; and introduction to the concept of no-arbitrage as a fundamental concept in financial mathematics.

**Credit Hours:** 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Format:** LAB

**ACTS 403 Problem Lab: Actuarial Models - Life Contingencies**

**Prerequisites:** ACTS 470/870, ACTS 471/871, and ACTS 473/873

**Description:** Problems as posed in the "Society of Actuaries (SOA) Exam "M"" and/or "Casualty Actuarial Society (CAS) Exam "3". Survival and severity models, "Markov Chain" models; life contingencies; and "Poisson" processes.

**Credit Hours:** 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Format:** LAB

**ACTS 404 Problem Lab: Construction and Evaluation of Actuarial Models**

**Prerequisites:** ACTS 410 and 425

**Description:** Problems as posed in the Society of Actuaries (SOA) Exam "C" and/or Casualty Actuarial Society (CAS) Exam "4". Construction of empirical models; construction and selection of parametric models; credibility theory; interpolation and smoothing of data; and simulation.

**Credit Hours:** 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Format:** LAB
### ACTS 405 Problem Lab: Actuarial Models - Financial Economics
**Prerequisites:** ACTS 440/840 and FINA 467
**Description:** Problems as posed in the "Society of Actuaries (SOA) Exam 'M'." Interest rate models; rational valuation of derivative securities (option pricing: put-call parity; the binomial model; Black-Scholes formula, and actuarial applications; interpretation of option Greeks and delta-hedging; features of exotic options; an introduction to Brownian motion and Ito's lemma); and risk management techniques.
**Credit Hours:** 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Format:** LAB

### ACTS 410 Introduction to Credibility, Smoothing of Data, and Simulation
**Crosslisted with:** ACTS 810
**Prerequisites:** STAT 463
**Description:** Full, partial, Buhlmann, and Buhlmann-Straub credibility models. Introduction to empirical Bayes and statistical distributions used to model loss experience. Application of "polynomial splines" to actuarial data. Simulation of "discrete" and "continuous random" variables in context of actuarial models. Simulation to "p-value" of hypothesis test. "Bootstrap method" of estimating the "mean squared error" of an estimator.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC
**Prerequisite for:** ACTS 404

### ACTS 425 Survival Models
**Crosslisted with:** ACTS 825
**Prerequisites:** STAT 463 with a grade of "C" or better
**Description:** Parametric and tabular survival models. Estimation based on observations that might not be complete. Concomitant variables. Use of population data. Applications to groups with impaired lives.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC
**Prerequisite for:** ACTS 404

### ACTS 430 Actuarial Applications of Applied Statistics
**Crosslisted with:** ACTS 830
**Prerequisites:** STAT 463 with a grade of "C" or better
**Notes:** Y
**Description:** Introduction to forecasting in actuarial science. Simple and multiple regression, instrumental variables, time series methods, and applications of methods in forecasting actuarial variables. Interest rates, inflation rates, and claim frequencies.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC

### ACTS 440 Interest Theory
**Crosslisted with:** ACTS 840
**Prerequisites:** MATH 208 or 208H with a grade of "Pass" or "C" or better, or parallel
**Notes:** Y
**Description:** Application of financial mathematics to problems involving valuation of financial transactions; equivalent measures of interest; rate of return on a fund; discounting or accumulating a sequence of payments with interest; and yield rates, length of investment, amounts of investment contributions or amounts of investment returns for various types of financial transactions; loans and bonds. Introduction to the mathematics of modern financial analysis. Calculations involving yield curves, spot rates, forward rates, duration, convexity, and immunization.
**Credit Hours:** 4
**Max credits per semester:** 4
**Max credits per degree:** 4
**Format:** LEC
**Prerequisite for:** ACTS 405; ECON 365, FINA 338; FINA 363; FINA 367; FINA 375; FINA 382; FINA 401; FINA 450; FINA 461, FINA 861; FINA 465, FINA 865

### ACTS 441 Introduction to Financial Economics
**Crosslisted with:** ACTS 841
**Prerequisites:** MATH 208 with grade of "C" or better or concurrent; ACTS 440
**Description:** Financial mathematics concepts related to short sales, forwards, options, futures, and swaps, and their use in risk management, hedging and investment strategies, fundamental concepts of put-call parity and no-arbitrage, and interest rate models.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC
**Prerequisite for:** ACTS 405; Actuarial Science (CAS) 6

### ACTS 442 Principles of Pension Valuation
**Crosslisted with:** ACTS 842
**Prerequisites:** ACTS 471/871 with a grade of "C" or better
**Description:** Actuarial cost methods. Determination of normal costs and accrued liability. Effect on valuation results due to changes in experience, assumptions and plan provisions. Valuation of ancillary benefits. Determination of actuarily equivalent benefits at early or postponed retirement and optional forms of payment.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC

### ACTS 450 Stochastic Processes for Actuaries
**Crosslisted with:** ACTS 850
**Prerequisites:** STAT 463 with a grade of "C" or better
**Description:** Introduction to stochastic processes and their applications in actuarial science. Discrete-time and continuous-time processes; Markov chains; the Poisson process; compound Poisson processes; non-homogeneous Poisson processes; arithmetic and geometric Brownian motions. Applications of these processes in computation of resident fees for continuing care retirement communities. Pricing of financial instruments.
**Credit Hours:** 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Format:** LEC
ACTS 470 Life Contingencies I  
**Crosslisted with:** ACTS 870  
**Prerequisites:** ACTS 440 and STAT 462, each with a grade of "C" or better  
**Notes:** Y  
**Description:** Theory and applications of contingency mathematics in the areas of life and health insurance, annuities, and pensions. Probabilistic models.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** ACTS 403  

ACTS 471 Life Contingencies II  
**Crosslisted with:** ACTS 871  
**Prerequisites:** ACTS 470 and STAT 462, each with a grade of "C" or better  
**Notes:** Y  
**Description:** Life insurance reserve for models based on a single life. Introduction to multiple life models for pensions and life insurance and to multiple decrement models.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** ACTS 403  

ACTS 473 Introduction to Risk Theory  
**Crosslisted with:** ACTS 873  
**Prerequisites:** ACTS 462 with a grade of "C" or better  
**Description:** Applications of compound distributions in modeling of insurance loss. Continuous-time compound Poisson surplus processes, computation of ruin probabilities, the distributions of the deficit at the time of ruin, and the maximal aggregate loss. The effect of reinsurance on the probability of ruin.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** ACTS 403  

ACTS 474 Introduction to Property/Casualty Actuarial Science  
**Crosslisted with:** ACTS 874  
**Prerequisites:** STAT 462 with a grade of "C" or better.  
**Description:** Mathematical, financial, and risk-theoretical foundations of casualty actuarial science. Risk theory, loss reserving, ratemaking, risk classification, credibility theory, reinsurance, financial pricing of insurance, and other special issues and applications.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** ACTS 403  

ACTS 475 Actuarial Applications in Practice  
**Crosslisted with:** ACTS 875  
**Prerequisites:** ACTS 471/871; FINA 307/307H or FINA 338  
**Description:** Principles and practices of pricing and/or funding and valuation for life, health, property and liability insurance, and annuities and pension plans. Commercially available actuarial modeling software.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  

AC: ACE 10 Integrated Product  

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.  

**Actuarial Science (B.S.)**  
**Career Information**  
The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.  

**Transferable Skills**  
- Apply mathematical and scientific skills to solve real-world problems  
- Develop basic techniques of statistical analysis  
- Make predictions using mathematical, statistical, and scientific modeling methods  
- Analyze and explain data  
- Support and communicate claims using clear evidence  
- Collaborate with a team to develop solutions  
- Confidently navigate complex, ambiguous projects and environments  
- Understand and operate within ethical framework for professional work in the field  
- Use quantitative analysis techniques  
- Use qualitative analysis techniques  

**Jobs of Recent Graduates**  
- Trainee Actuary, KPMG - Tokyo, Japan  
- Executive Actuarial Analyst, Pacific & Orient Insurance Co. Berhad - Kuala Lumpur, Malaysia  
- Instructional Technology Specialist, University of Nebraska-Lincoln - Lincoln NE  
- Associate Actuarial Analyst, Coventry Health Care - Omaha NE  
- Underwriting Service Assistant, State Farm - Lincoln NE  
- Actual Technician, Rockhill Insurance - Kansas City MO  
- Value Chain Analyst, ATS Secured - Omaha NE  
- Actuarial Development Program, Lincoln Financial Group - Omaha NE  
- Actuarial Assistant, Milliman Consulting - Milwaukee WI  
- Underwriting Service Assistant, State Farm - Lincoln NE  
- High school Math teacher, Kansas City Teaching Fellows - Kansas City KS  
- Statistician, USDA - Lincoln NE  
- Underwriting Specialist, Berkshire Hathaway Homestate Companies - Omaha NE  
- Property and Casualty Actuarial Analyst, Allstate Insurance - Chicago IL  
- Teller, Union Bank and Trust - Lincoln NE  
- ACTS 871  
- ACTS 870  

**Internships**  
- Actuarial Intern, Allstate Insurance - Northbrook IL  
- Actuarial Intern, Ameritas - Lincoln NE  
- Actuarial Intern, CSG Actuarial - Omaha NE  
- Actuarial Intern, Hannover - Denver CO  
- Actuarial Intern, Lincoln Financial Group - Omaha NE  

PLEASE NOTE
• Actuary Intern, Markel - Omaha NE
• Actuarial Intern, Mutual of Omaha - Omaha NE
• Compliance Intern, State Farm Insurance - Bloomington IL
• Property and Casualty Actuarial Intern, The Hartford Insurance Company - Hartford CT
• Actuarial Intern, Willis Towers Watson - St. Louis MO

**Graduate & Professional Schools**
• Ph.D., Statistics, University of Nebraska-Lincoln - Lincoln NE
• Master’s Degree, Management Science & Engineering, Stanford University - Stanford CA
• Master’s Degree, Teaching, Pittsburg State University - Pittsburg KS
• Master’s Degree, Economics, University of New Hampshire - Durham NH