

ASRM - ACTUARIAL SCIENCE & RISK MANAGEMENT

ASRM Class Schedule (<https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/ASRM/>)

Courses

ASRM 101 Introduction to Actuarial Science credit: 1 Hour. (<https://courses.illinois.edu/schedule/terms/ASRM/101/>)

Introduction to actuarial science as a profession and as a field of study. Students will learn about the skills and qualities of professional actuaries, the process to become a credentialed actuary, and the various career paths for actuaries. The course will focus on what students can do during their time at the University to be as well prepared as possible to become a successful actuary after graduation Approved for Letter and S/U grading. Prerequisite: For freshman or new transfer students only.

ASRM 195 Foundations of Data Management credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/195/>)

An introduction to basic data management concepts and programming skills necessary for analyzing data in actuarial and financial applications. Students are expected to learn how to store, clean, explore and analyze data using a programming language and statistical software. Prerequisite: For actuarial science majors only. For freshman only.

ASRM 199 Undergraduate Open Seminar credit: 1 to 5 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/199/>)

Covers special topics. Approved for Letter and S/U grading. May be repeated in the same term up to 12 hours or separate terms up to 12 hours.

ASRM 210 Theory of Interest credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/210/>)

Study of compound interest and annuities; applications to problems in finance. Prerequisite: MATH 231 or equivalent.

ASRM 390 Introduction to Actuarial Research credit: 0 to 3 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/390/>)

Guided research on introductory actuarial topics. Approved for Letter and S/U grading. May be repeated in separate terms. Prerequisite: Instructor approval required.

ASRM 392 Actuarial Problem Solving credit: 1 Hour. (<https://courses.illinois.edu/schedule/terms/ASRM/392/>)

Methods and techniques of solving problems in actuarial mathematics for advanced students intending to enter the actuarial profession. Approved for S/U grading only. May be repeated in the same or separate terms to a maximum of 4 hours. Prerequisite: Consent of instructor.

ASRM 398 Actuarial Internship credit: 0 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/398/>)

Full-time or part-time practice of actuarial science in an off-campus government, industrial, or research laboratory environment. Summary report required. Approved for S/U grading only. May be repeated in separate terms. Prerequisite: After obtaining an internship, Actuarial Science students must request entry from the Director of the Actuarial Science Program.

ASRM 401 Actuarial Statistics I credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/401/>)

Same as STAT 408. See STAT 408.

ASRM 402 Actuarial Statistics II credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/402/>)

Same as STAT 409. See STAT 409.

ASRM 406 Linear Algebra with Financial Applications credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/406/>)

Emphasizes techniques of linear algebra and introductory and advanced applications to actuarial science, finance and economics. Topics include linear equations, matrix theory, vector spaces, linear transformations, eigenvalues and eigenvectors and inner product spaces. In addition, current research topics such as modeling, data mining, and generalized linear models are explored. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Credit is not given for both ASRM 406 (formerly MATH 410) and any of MATH 125, MATH 225, MATH 415 or MATH 416. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241; ASRM 210 (formerly MATH 210) or FIN 221; or consent of instructor.

ASRM 409 Stochastic Processes for Finance and Insurance credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/409/>)

An introduction to stochastic processes and their applications to finance and insurance. Topics include conditional probability, conditional expectation, Markov chains, Poisson processes, reliability theory, Brownian motion and elementary introductions to insurance risk theory and option pricing theory. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Prerequisite: ASRM 401 (formerly MATH 408) or MATH 461.

ASRM 410 Investments and Financial Markets credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/410/>)

An introduction to financial models and their applications to investment and financial markets. Topics include derivative markets, derivatives pricing, interest rate models, dynamic hedging and other risk management techniques. 3 undergraduate hours. 4 graduate hours. Prerequisite: Credit or concurrent registration in ASRM 402 or STAT 410.

ASRM 441 Statistics for Risk Modeling I credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/441/>)

Introduction to statistics for risk modeling, starting with simple linear regression, extending to multiple linear regression and diagnostic testing of model adequacy and assumptions. Students learn how to identify, test, and correct for influential points, heteroscedasticity and multicollinearity. The course also covers time series from white noise and random walks to ARIMA models, and how time series models are used for forecasting in financial applications. 4 undergraduate hours. 4 graduate hours. Credit is not given towards graduation for both ASRM 441 and STAT 420/ASRM 450. Prerequisite: ASRM 401 or STAT 400.

ASRM 442 Statistics for Risk Modeling II credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/442/>)

Introduction to the theory and practice of supervised and unsupervised data analysis techniques. Topics include statistical learning methodologies, cross validation and model selection methods, generalized linear regression, data shrinkage, ridge and lasso methods, decision trees, regression and classification techniques, principal components, unsupervised learning techniques, cluster analysis. 4 undergraduate hours. 4 graduate hours. Credit is not given towards graduation for ASRM 442 and ASRM 451/STAT 432. Prerequisite: ASRM 401 or STAT 400; ASRM 441 or ASRM 450.

ASRM 450 Methods of Applied Statistics credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/450/>)

Same as STAT 420. See STAT 420.

ASRM 451 Basics of Statistical Learning credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/451/>)

Same as STAT 432. See STAT 432.

ASRM 453 Applied Bayesian Analysis credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/453/>)
Same as STAT 431. See STAT 431.

ASRM 454 Generalized Linear Models credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/454/>)
Theoretical foundations of different linear models including basic linear models, generalized linear models, linear mixed models, and generalized linear mixed models. Cases studies are offered for students to perform statistical analysis with model selection and decision making, and to learn advantages and disadvantages under different circumstances of financial and insurance applications. 3 undergraduate hours. 4 graduate hours. Prerequisite: ASRM 441 or ASRM 450.

ASRM 455 Predictive Analytics credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/455/>)
Emphasizes techniques of predictive analytics and introductory applications to actuarial science, finance, and economics. Gives an overview of the different statistical learning methods and algorithms that can be employed to discover useful information from datasets, to explain how to build a predictive model using computational software packages (R and Python), and to effectively communicate the results in a scientific report. Topics include identifying the business problem, data preparation, data visualization, model building processes (generalized linear models, decision trees, cluster and principal component analyses, etc.), model selection, refinement, and validation. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Prerequisite: ASRM 401 or STAT 200 or STAT 361.

ASRM 461 Loss Models credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/461/>)
Foundation in the actuarial modeling process; construction, selection and validation of empirical models and parametric models. Also covers survival, severity, frequency and aggregate loss models; statistical methods to estimate model parameters. 4 undergraduate hours. 4 graduate hours. Credit is not given for ASRM 461 and ASRM 561. Prerequisite: ASRM 401/STAT 408, MATH 461 or STAT 400/MATH 463; credit or concurrent registration in ASRM 402/STAT 409 or STAT 410/MATH 464.

ASRM 462 Advanced Loss Models, Credibility, and Ratemaking credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/462/>)
Advanced loss models used in casualty, property and health insurance. Topics include mixed and aggregate loss models, the model building cycle from model specification, to parameter estimation and calibration, to model implementation and selection, and to model assessment. Credibility theory will be also be discussed, including Buhlmann, Buhlmann-Straub and Bayesian credibility. The course also covers ratemaking and reserving in casualty insurance. 4 undergraduate hours. 4 graduate hours. Credit is not given towards graduation for both ASRM 462 and ASRM 561. Prerequisite: ASRM 401 or STAT 400; ASRM 461.

ASRM 469 Casualty Actuarial Mathematics credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/469/>)
An introduction to property/casualty actuarial science, exploring its mathematical financial, and risk-theoretical foundations. Specific topics include risk theory, loss reserving, ratemaking, risk classification, credibility theory, reinsurance, financial pricing of insurance, and other special issues and applications. 3 or 4 undergraduate hours. No graduate credit. Credit is not given for ASRM 469 (formerly MATH 479) and ASRM 569 (formerly MATH 569). Prerequisite: ASRM 210 (formerly MATH 210); credit or concurrent registration in ASRM 402 (formerly MATH 409); or consent of instructor.

ASRM 471 Life Contingencies I credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/471/>)
Distribution of the time-to-death random variable for a single life, and its implications for evaluations of insurance and annuity functions, net premiums, and reserves. 4 undergraduate hours. 4 graduate hours. Prerequisite: ASRM 401 (formerly MATH 408) and ASRM 210 (formerly MATH 210).

ASRM 472 Life Contingencies II credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/472/>)
Continuation of ASRM 471. Introduction to tabular or parametric survival models with single or multiple-life states; life insurance and annuity premium calculations; reserving and profit measures; introductions to universal life insurances, participating insurances, pension plans and retirement benefits. 3 undergraduate hours. No graduate credit. Credit is not given for ASRM 472 (formerly MATH 472) and ASRM 575 (formerly MATH 565). Prerequisite: ASRM 471 (formerly MATH 471).

ASRM 490 Actuarial Research credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/490/>)
Guided research on actuarial topics. 1 to 4 undergraduate hours. 1 to 4 graduate hours. Approved for Letter and S/U grading. May be repeated in separate terms. Prerequisite: ASRM 390 or consent of instructor.

ASRM 499 Topics in Actuarial Science credit: 0 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/499/>)
Covers special topics in actuarial science. 1 to 4 undergraduate hours. 1 to 4 graduate hours. Approved for Letter and S/U grading. May be repeated. Prerequisite: Consent of instructor.

ASRM 510 Financial Mathematics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/510/>)
Theoretical basis of financial mathematics and techniques. Topics include financial stochastic processes, Ito calculus, martingale pricing, hedging, simulations, interest rate models, etc. 4 graduate hours. No professional credit. Prerequisite: ASRM 402 (formerly MATH 409) or MATH 464.

ASRM 533 Risk Management Practices and Regulation credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/533/>)
Offers a comprehensive coverage of different aspects of risks and regulation of financial institutions. Topics include financial institutions and their trading, risk management frameworks, market risk, interest rate risk, liquidity risk, credit risk, operational risk, latest industry practices and regulation, including Basel and Solvency, fundamental review of trading books, scenario analysis and stress testing, etc. 4 graduate hours. No professional credit. Approved for Letter and S/U grading. Prerequisite: ASRM 401 or MATH 461 or STAT 400.

ASRM 539 Risk Analytics and Decision Making credit: 2 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/539/>)
The course will give students the opportunity to practice their existing data analytics skills to solve diverse real-world cases. Students will also deepen their ability to select the appropriate method to solve each problem, clearly and concisely present results, and clearly articulate the strengths and limitations of their analyses. 2 graduate hours. No professional credit. Prerequisite: Basic knowledge of probability and statistics.

ASRM 551 Statistical Learning credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/551/>)
Same as CSE 542 and STAT 542. See STAT 542.

ASRM 555 Advanced Predictive Analytics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/555/>)
Emphasizes applications of advanced predictive analytics to actuarial science, finance and economics. Builds on the existing analytics topics, which are Statistics for Risk Modeling (SRM) and Predictive Analytics (PA). It will introduce advanced statistical learning methods and algorithms that can be employed to discover useful information from real-life datasets, to explain how to build a predictive model based on business problem, and to communicate the results in a scientific report. Same as STAT 541. 4 graduate hours. No professional credit. Prerequisite: ASRM 455.

ASRM 561 Loss Data Analytics & Credibility credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/561/>)
Introduction to the actuarial modeling process: construction, selection and validation of empirical and parametric models. Survival, severity, frequency and aggregate loss models; statistical methods to estimate model parameters. 4 graduate hours. No professional credit. Credit is not given for ASRM 461 (formerly MATH 478) and ASRM 561 (formerly MATH 568). Prerequisite: ASRM 401 (formerly MATH 408), MATH 461 or MATH 463.

ASRM 569 Extreme Value Theory and Catastrophe Modeling credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/569/>)
Principles and fundamental techniques of ratemaking for casualty and property insurances; risk classification; coinsurance; estimation of claim liabilities; financial reporting; catastrophe modeling. 4 graduate hours. No professional credit. Credit is not given for ASRM 469 (formerly MATH 479) and ASRM 569 (formerly MATH 569). Prerequisite: ASRM 401 (formerly Math 408).

ASRM 575 Life Insurance and Pension Mathematics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/575/>)
Tabular and parametric survival models with single or multiple-life states; life insurance and annuity premium calculations; reserving, and profit measures; introduction to universal life insurances, participating insurances, pension plans and retirement benefits. 4 graduate hours. No professional credit. Credit is not given for ASRM 472 (formerly MATH 472) and ASRM 575 (formerly MATH 565). Prerequisite: ASRM 471 (formerly MATH 471).

ASRM 593 Graduate Internship credit: 0 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/593/>)
Full-time or part-time practice of graduate-level actuarial science, risk management or advanced analytics in an off-campus government, industrial, or research laboratory environment. Summary report required. 0 graduate hours. No professional credit. Approved for S/U grading only. May be repeated in separate terms. Prerequisite: After obtaining an internship, Actuarial Science or Risk Management graduate students must request entry from the Director of the Actuarial Science Program. Departmental approval required.

ASRM 595 Advanced Topics in Actuarial Science and Risk Analytics credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/595/>)
Covers special topics in actuarial science and risk analytics. 1 to 4 graduate hours. No professional credit. May be repeated if topics vary. Prerequisite: Consent of instructor.

ASRM 597 Reading Course credit: 1 to 8 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/597/>)
Independent study in actuarial science and risk analytics. 1 to 8 graduate hours. No professional credit. Approved for Letter and S/U grading. May be repeated. Prerequisite: Consent of instructor.

ASRM 598 Literature Seminar credit: 0 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/598/>)
Students present seminars and discussions on advanced topics in areas of actuarial and financial mathematics and advanced analytics. 0 to 4 graduate hours. No professional credit. Approved for Letter and S/U grading. May be repeated in separate terms or up to 8 hours in the same term if topics vary. Prerequisite: Consent of instructor.

ASRM 599 Thesis Research credit: 0 to 16 Hours. (<https://courses.illinois.edu/schedule/terms/ASRM/599/>)
Research topics in actuarial science and risk analytics. 0 to 16 graduate hours. No professional credit. Approved for S/U grading only. May be repeated if topics vary. Prerequisite: Consent of Instructor.