SIU BS degree: Mathematics in Actuarial Science

Actuarial courses Math 400, 401, 402, 403, and 404 were added to the 2014-2015 undergraduate catalog while the SIU actuarial program appeared in the 2015-2016 undergraduate catalog. Math 474, 480, 483, 484, 485, 486, 580, and 586 are also useful.

Actuaries put a price on risk, and Actuaries are often ranked as a top ten job with high pay. See (http://money.cnn.com/2013/04/25/news/economy/best-job-actuary/index.html), (https://money.usnews.com/careers/best-jobs/actuary), and (https://scinternational.com/actuary-named-one-of-the-best-jobs-in-america/). The Actuarial program at Southern Illinois University provides course work in Mathematics to prepare students for work as Actuaries. Students become Actuaries by taking three Validation by Educational Experience (VEE) course sequences and by passing professional examinations given by the Society of Actuaries (SOA, see www.soa.org) and Casualty Actuarial Society (CAS, see www.casact.org). The professional exams cover probability, financial mathematics for investments including interest theory and financial derivatives, life contingencies: mathematics for life insurance, loss models, and statistics (regression, time series, Statistical Learning). Freshmen admitted to the program should have at least a 24 Math ACT score. Students can also enroll as Math majors and transfer to the Actuarial program after receiving a C or higher in Math 250.

Becoming an actuary is a potential option after you get your degree. You can be hired after receiving a Bachelor's degree and passing (1 or more likely) 2 exams (SOA Exam P = CAS Exam 1P=Probability exam Math 483, and the FM Exam Math 400 are common). From (https://www.dwsimpson.com/about/salary-survey/), in 2020 salary was roughly $46000-$56000 for one exam, $34000-$72000 for two exams, $47000-$87000 for three exams, and $50000 - $84000 for 4 exams with less than 1 year of actuarial experience. An ASA (Associate of the Society of Actuaries) makes about $75000-$120000 with 1-3 years of experience while an FSA (Fellow of the Associate of Actuaries) makes about $104000-$165000 with 3-5 years of experience. Useful links are (www.soa.org), (www.casact.org), (www.actexmadriver.com) and (www.beanactuary.org).

Actuarial students in the SIU Actuarial program take two or three VEE course sequences and preparation for professional Actuarial exams:

i) Econ 240 and Econ 241: (Micro and Macro Economics) for
VEE Economics.

ii) ACCT 220, ACCT 230, FIN 330, and FIN 361 for
VEE Accounting and Corporate Finance. (ACCT 208 is a prereq but Math 483 is better.)

iii) Math 483, (403, 404, plus selected topics from Math 580) meet the SOA VEE Statistics requirement.

iv) Math 483 (Probability and Statistics) for Exam P/1: Probability exam; Math 480 (Probability and Stochastic Processes) is also useful for Exam P/1.

v) Math 400 (Financial Mathematics: Interest Theory and Financial Derivatives) for Exam FM/2: Financial Mathematics exam; prereq Math 250 = CALC II;

vi) Math 401 (Life Contingencies I) is useful for SOA Exam FAM-L: Fundamentals of Actuarial Actuarial Mathematics-Long Term.

vii) Math 402 (Life Contingencies II) is useful for SOA Exam ALTAM: Advanced Long-Term Actuarial Mathematics.

viii) Math 403 (Loss Models I) is useful for SOA exam FAM-S: Fundamentals of Actuarial Actuarial Mathematics-Short Term.

ix) Math 404 (Loss Models II) is useful for SOA exam ASTAM: Advanced Short-Term Actuarial Mathematics.

x) Math 484, 485, and 586 are useful for SOA exams SRM: Statistics for Risk Modeling and PA: Predictive Analytics.

xi) Math 483, 480, 485, 401, and 586 are useful for CAS exam MAS-I: Modern Actuarial Statistics.

xii) Math 474, 404, and 586 are useful for CAS exam MAS-II: Modern Actuarial Statistics II.

Econ 463 can be useful for Math 484 and 474 topics.

A sample 120 hour BS program is shown below. Math 150, 250, 251 are Calc I-III. Math 221 is Linear Algebra. Math 300I, 302, and Group A,B,C classes like M352, M319 and M475, are needed to meet degree requirements.

SIU Actuarial Program

FIRST YEAR	FALL	SPRING
MATH 150, MATH 250	4	4
CS 202, Fine Arts	4	3
ENGL 101, ENGL 102	3	3
ECON 240, ECON 241	3	3
UCOL 101, Human Health	1	2
Total	15	15

SECOND YEAR	FALL	SPRING
MATH 221, Math 400	3	4
MATH 251, MATH 483	3	4
ACCT 220, ACCT 230	3	3
CMST 101,	3	
Humanities 1,Advanced UCC Physical Science 1	3	4
Total	15	15
THIRD YEAR	FALL	SPRING
MATH 401&402 or MATH 403&404	3	3
MATH 484, Supportive Skills 2	3	3
Humanities(Math300I), Social Science 2	3	3
Math 302, Math Group C	3	3
Advanced UCC Biological Science 1, multicultural	4	3
Total	16	15

FOURTH YEAR	FALL	SPRING
Math Group B, Math Group A	3	3
FIN 330, FIN 361	3	3
MATH 474	3	
Advanced UCC Physical Science 2, Biological Science 2	3	3
Electives	3	5
Total	15	14

Notes:

a) Math 580-Statistical Theory is useful for CAS-MAS-I: Modern Actuarial Statistics I and VEE Statistics.

b) Math 586-Statistical Learning is useful for SOA SRM: Statistics for Risk Modeling and CAS-MAS-I: Modern Actuarial Statistics, and SOA PA: Predictive Analytics. Math 486 can be useful for the SOA PA exam.

c) The SOA Exam SRM: Statistics for Risk Modeling covers the old VEE Applied Statistical Methods material (Math 484: multiple linear regression, Math 474 time series), as well as GLMs (Math 485), PCA, and Statistical Learning Methods (Math 586, including decision trees and cluster analysis). The two texts from the exam syllabus are James, G., Witten, D., Hastie, T.,

and Tibshirani, R. (2013), *An Introduction to Statistical Learning With Applications in R*, Springer, New York, NY., and Frees, E.W. (2010), *Regression Modeling with Actuarial and Financial Applications*, Cambridge University Press, New York, NY.

d) SOA PA: Predictive Analytics exam also covers (Math 484) multiple linear regression, GLMs (Math 485), *R* programming and *R Studio* (Math 486 and 586), and Statistical Learning Methods (Math 586).

For CAS exams, see (http://www.casact.org/admissions/syllabus/).

The two important texts from the exam syllabi are James, G., Witten, D., Hastie, T., and Tibshirani, R. (2013), *An Introduction to Statistical Learning With Applications in R*, Springer, New York, NY., and Frees, E.W. (2010), *Regression Modeling with Actuarial and Financial Applications*, Cambridge University Press, New York, NY.

See (https://www.soa.org/education/exam-req/edu-asa-req.aspx).