Actuarial Science

UNIVERSITY of WISCONSIN UWMILWAUKEE

College of Letters and Science

Interested in This Major?

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What is Actuarial Science?

Actuarial science is the quantitative analysis of risk. In addition to mathematics and statistics courses, students in actuarial science take classes in finance, economics and computer programming.

What Do Actuaries Do?

Actuaries help individuals, businesses and society manage risk by evaluating the likelihood of future events and creating plans to reduce the negative financial or emotional impact of undesirable events. Some of the questions that actuaries address on a daily basis include:

- What price best balances an insurance company's risk tolerance with various risk parameters such as age of the insured, health status, place of residence, and other risk characteristics?
- What would be the economic loss in the event of a flood, and how can these costs be covered?
- How large a fund is needed for a company to provide pensions for its employees?
- How likely is it for someone to be hospitalized? What is the average duration of a hospital stay, and how can the costs associated with each day of hospitalization be provided for?
- In the event of a merger, how can the employee benefits plans of the different organizations be reconciled?
- How should an investment portfolio be balanced to maximize return and minimize risk?

Actuaries also must take this information and convey it to their companies and customers clearly and concisely through written reports, graphs, charts, or other visual or oral presentation formats.

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Career Opportunities

The actuarial profession consistently is rated as one of the top professions for income potential, job security, work environment and growth potential. Prior to entering the profession, actuaries must pass a series of rigorous professional examinations, but a graduate degree is not a requirement.

The Bureau of Labor Statistics predicts 26% growth in jobs for actuaries in the next 10 years.

Although most actuaries are employed by insurance companies, actuarial consulting firms, financial companies, and the government, every company in the private and public sector faces risk of some sort and thus employs professionals to manage this risk. For example, transportation firms, oil and gas companies, the Social Security Administration, airlines, large manufacturers, and federal and state government agencies that deal with labor issues all require the expertise of actuaries.

Surveys of practicing actuaries generally show that most are very satisfied with their career. They describe their work as dynamic and challenging and believe they are developing lifelong professional skills that are transferable across multiple industries.

Is Actuarial Science Right For Me?

Actuaries like to solve complex problems and explain their solutions to others. They enjoy learning and studying new topics on a regular basis, work well with all types of people, have strong writing and oral presentation skills and can work independently as well as in teams. Actuaries tend to be self-motivated and have good business sense. Actuaries must have good interpersonal skills as well as specialized knowledge in mathematics, statistics, computer programming, economics and finance.

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Preparatory Courses

Successful actuarial students have solid high school preparation in mathematics. It is highly recommended that high school students also take some computer science courses and statistics courses. Communication classes also are helpful.

Before delving into the core Math and Statistics courses, students in the actuarial program will take:.

Course #	Course Title
Three semesters of Calculus and Analytical Geometry with an average GPA of 2.5	
Math 234	Linear Algebra and Differential Equations
Bus Adm 201	Introduction to Financial Accounting
Econ 103 and 104	Principles of Microeconomics and Macroeconomics
TWO of the following:	
Bus Adm 230	Introduction to Information Technology Management
CompSci 151	Introduction to Scientific Programming in Fortran
CompSci 201	Introductory Computer Programming
ONE of the following:	
MthStat 215	Elementary Statistical Analysis
Econ 210	Economic Statistics
Bus Adm 210	Introduction to Management Statistics

Core Courses in the Major

Course #	Course Title
Math 311	Theory of Interest
MthStat 361 and 362	Introduction to Mathematical Statistics I and II
MthStat 563	Regression Analysis
MthStat 564	Time Series Analysis
MthStat 591	Foundations of Professional Practice in Actuarial Science
MthStat 592	Actuarial Science Laboratory I: Probability, Finance, and Economics
MthStat 593	Actuarial Science Laboratory II: Interest Theory, Finance, and Economics
Econ 301 or Econ 302	Intermediate Microeconomics OR Intermediate Macroeconomics
Math 599	Capstone Experience
Bus Adm 350 or Bus Adm 450	Principles of Finance or Intermediate Finance

One of the following pairs:	
Math 571 and MthStat 691	Introduction to Probability Models and Actuarial Models I: Life Contingencies
Math 571 and MthStat 692	Introduction to Probability Models and Actuarial Models II: Financial Economics
MthStat 596 and 597	Actuarial Statistics I: Fitting of Loss Models and Actuarial Statistics II: Credibility, Risk Measures and Related Topics.

Students are encouraged to take electives in communication, economics, and advanced actuarial courses.

Professional Development and Job Preparation: Every year the Actuarial Science Department offers a one-credit Professional Development course, covering how to work well in a team, how to present your statistical findings in a report, how different areas of an insurance company work together, and more.

Working actuarial professionals come to campus to speak to current students about their work.

This is also a great opportunity for students to network and learn about internships and job opportunities.

Actuarial Exams

Actuaries achieve professional status by passing a set of examinations and other requirements set forth by the Casualty Actuarial Society and/or the Society of Actuaries. It is recommended that students start taking the exams before graduation, as this is looked upon favorably by most employers. Most will reach the "Associate" level in three to five years, as the exams continue during the first few years of an individual's career. Employers generally are supportive of the process by providing time off to study, paying the exam fees, or offering raises each time an exam is passed.

The testing series includes:

- Exam P/1 (Probability)
- Exam FM/2 (Financial Mathematics)
- Exam MFE/3F (Actuarial Models: Financial Economics)
- Exam MLC (Actuarial Models: Life Contingencies)
- Exam C/4 (Construction and Evaluation of Actuarial Models)

After a few years of work, most actuaries strive for the "Fellowship" level, which generally consists of additional exams, often in a specialty area related to property and casualty or life and health insurance.

Internships and Financial Aid

High achieving students may qualify for some of the college-wide or campus-wide scholarships available at UWM. Students are also encouraged to visit the following website for national scholarships: www.beanactuary.org/college/scholarships.cfm.

Highly qualified students have interned at various local insurance companies and actuarial consulting firms. For more information about the financial aid options, please contact: hoy@uwm.edu.

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UWM Actuarial Science 4 Year Plan

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This sample four-year plan shows just one possible pathway to earning a degree with this major in four years. This plan **does not** replace the advice of your advisor, and students are cautioned to meet regularly with their advisor to create a personalized plan that matches their particular circumstances. This plan also follows the degree requirements for students who began their UWM education in Fall of 2013 or later. If you started at UWM prior to Fall of 2013, your degree requirements may be different.

Degree Requirements (brief summary):

1. English Proficiency and UWM Oral and Written Communication (OWC) GER - English 102 (OWC-A) and one OWC-B course
2. Math Proficiency and UWM Quantitative Literacy (QL) GER - Math 102, 103, 105, or 108 (QL-A) and a QL-B course
3. Formal Reasoning - 3 credits; satisfied by calculus courses
4. Foreign Language – 4 semesters of a single Foreign Language (or 3 semesters of one language and 2 semesters of another language)
5. L&S Humanities – 12 credits
6. L&S Social Sciences – 12 credits
7. L&S Natural Science – 12 credits including a laboratory
8. L&S International – 9 credits usually accomplished in conjunction with Humanities and/or Social Science courses
9. UWM Arts GER – 3 credits
10. UWM Cultural Diversity GER – 3 credits usually accomplished in conjunction with a Humanities or Social Science course
11. 120 credits including 90 credits in L&S and with 36 of the 90 credits in L&S upper-level (numbered above 300) courses
12. Complete the Actuarial Science major requirements:
    - at least 15 credits at the 300 level or above completed at UWM
    - All of Math 231, 232, 233, 234, 311, and 599
    - All of MthStat 361, 362, 563, 564. 591, 592, and 593
    - All of Econ 103, 104, and either 301 or 302
    - Bus Adm 201
    - One of MthStat 215, Econ 210, or Bus Adm 210
    - Two of Bus Adm 230, CompSci 151, and CompSci 201
    - One of Bus Adm 350 and 450
    - One of the following pairs:
        - » Math 571 & MthStat 691
        - » Math 571 & MthStat 692
        - » MthStat 596 & 597

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Sample Four Year Plan:

There are hundreds of courses that satisfy various requirements (http://www4.uwm.edu/letsci/requirements/), and courses in the major can be used. For example, Econ 103 counts towards the major and towards the Social Science GER. (This sample assumes no high school Foreign Language was taken and that the student placed into college-level Math and English.)

	Semester 1	Semester 2
Year 1	Math 116	Math 231 (NS)
	English 101	English 102 (OWC-A)
	1st semester Foreign Language	2nd semester Foreign Language
	Math 117	MthStat 215 (QL-B, NS)
	Econ 103 (SS)	Econ 104 (SS)
Year 2	Math 232	Math 233
	3rd semester Foreign Language (Int'l)	4th semester Foreign Language (Int'l)
	Bus Adm 201	Bus Adm 230
	MthStat 591	Math 311*
	CompSci 201 or 151	Econ 301 or 302
Year 3	Math 234	L&S Natural Science w/lab
	L&S Social Science/ International, not Econ	L&S Social Science, not Econ
	MthStat 361	MthStat 362
	Bus Adm 450**	MthStat 592
	MthStat 593	Math 599
Year 4	MthStat 563	MthStat 564
	MthStat 596	MthStat 597
	OWC-B	L&S upper-level Humanities
	L&S Humanities	Upper-level L&S elective
	Elective	Elective

(SS) Social Science GER

(NS) Natural Science GER

(Int'l) International requirement

* offered only in spring; Jr. standing prerequisite will be waived for qualified students

** Bus Adm 350 prerequisite will be waived for students in Actuarial Science