Introduction to the Actuarial Career

Presented by Bruin Actuarial Society
Spring Quarter 2018
1. What is an actuary?
2. What does an actuary do?
3. In which industries do actuaries work?
4. What do actuarial students learn?
5. Why become an actuary?
6. What does it take to become an actuary?
7. What are the different actuarial societies?
8. Where do I start?
9. How can I get an actuarial internship for summer 2019?
What is an actuary?

An actuary is a **business professional** who uses mathematical and statistical techniques to identify, quantify, and manage the risks that individuals and businesses face.
Where do actuaries work?

Actuaries work at insurance companies, consulting firms, and government agencies to ensure that individuals and businesses are accepting risk responsibly and sustainably.
Where do actuaries work?

Consulting Firms → pwc → Mercer → Aetna → State Farm → Pacific Life

Insurance Companies
What does an actuary do?
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>How much does the California Earthquake Authority need to charge homeowners to cover damages when The Big One strikes?</td>
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<tr>
<td>How much does General Motors need to save this year to cover employees' pensions after they retire?</td>
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<tr>
<td>What benefits can Medicaid offer while making sure federal and state contributions will cover the costs?</td>
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</table>
Actuaries can solve a company’s most pressing questions.

1. Should my company purchase advanced safety features like adaptive headlights and backup cameras for its fleet of company vehicles?

By how much will they reduce accidents’ frequency and severity? By how much will my auto insurance premiums go down?
Actuaries can solve an app’s most pressing questions.

2 A rideshare app service is liable for drivers’ accidents (1) while they search for riders, (2) en route to pickup, and (3) en route to the destination.

Does accident frequency and severity differ between these periods? Should the company self-insure (pay for accidents out-of-pocket) or buy car insurance?
Actuaries can solve policymakers’ most pressing questions.

If the government decides to allow health insurance companies to offer cheaper, less comprehensive medical plans, how many of our healthier policyholders will switch to them, and by how much will everyone else’s premiums increase?
CalPERS (California Public Employees’ Retirement System) expects 7% returns on investments.

How much are taxpayers going to have to pay to shore up state employees’ pensions if investment returns fall short?
In which industries do actuaries work?
The three major industries for actuaries are (1) Property & Casualty Insurance, (2) Health Insurance, and (3) Retirement & Life Insurance.
Property & Casualty Insurance

Health Insurance
Retirement & Life Insurance

P&C insurance covers PROPERTY and LIABILITY.

This includes home insurance, personal & commercial auto insurance, disaster insurance, workers’ compensation, and medical malpractice.
Property & Casualty Insurance
Health Insurance
Retirement & Life Insurance

**Pricing:** How much more does AAA have to charge drivers who have a DUI conviction? How much discount can we give drivers whose cars have more airbags?
Reserving: How much cash does Farmers have to keep on-hand to pay claims? How much can it use to invest for profit?

How much will this month’s accidents cost us by the time they are all paid for?
Health insurance includes MEDICAL, VISION, and DENTAL coverage.

Actuaries work both on individual plans (Covered California), and group benefits (a company’s health coverage for its employees).
Pricing and Reserving: How much more do we need to charge smokers to cover their higher risk? By how much can we lower premiums if we invest the premiums we collect?
Healthcare Policy: What happened to premiums when the Affordable Care Act required all people to buy health insurance? What happens now that the individual mandate has been repealed?
Retirement actuaries work on companies’ PENSION PLANS and 401(k) BENEFITS.

Life insurance actuaries craft whole and term LIFE INSURANCE policies and products like ANNUITIES.
Response to changes in life expectancy: How much more do I have to pay for employees’ pensions to account for people living longer and longer? What adjustments to Social Security are needed for it to remain solvent?
Response to changes in interest rates: Can a company’s pension program remain solvent when interest rates are low for a long period? How much would it save by switching employees’ retirement benefits to 401(k) matching?
Lloyd’s of London (insurance market) has insured:

- Bruce Springsteen’s voice
- David Beckham’s legs
- Egon Ronay’s taste buds
- Alien abduction insurance for ~30,000 policyholders
Nontraditional Actuarial Roles

*Industries with nontraditional actuarial roles:*

- Accounting/Auditing
- Government
- Banking/Finance
- Sports
- Meteorology
- Private corporations
- Teaching
- And many more!

*Main point:* In every industry, there are various risks and ways to maximize efficiency. This is where actuaries can step in!
What do actuaries learn?
Whether in class or on exams, you’ll never have to ask, “Is this ever used in real life?”

01  |  Probability
02  |  Financial Mathematics
03  |  Investment & Financial Markets
04  |  Construction & Evaluation of Actuarial Models
Assorted Topics in Probability

- Independence of events
- Conditional probability
- Probability density functions and cumulative distribution functions of various distributions:
  - Discrete distributions: Binomial, Poisson, etc.
  - Continuous distributions: Exponential, Normal, etc.
- Moment generating functions and joint MGFs
- Central Limit Theorem
- Covariance and correlation coefficients
Assorted Topics in Financial Mathematics

- Time Value of Money: Interest & discount rates
- Present value of various types of annuities
- Amount of interest and principal repayment in a given loan payment
- Bonds: book value, amortization of premium, accumulation of discount
- Duration and convexity of a portfolio’s cash flows
- Cash flow matching and immunization
- Interest rate swaps and determinants of interest rates
Assorted Topics in Investment & Financial Markets

- Corporate Finance
  - Efficient Markets Hypothesis (EMH), Mean-Variance Portfolio Theory, Capital Asset Pricing Model (CAPM), Behavioral Finance
  - Cost of capital, capital structure, equity & debt financing

- Derivatives
  - Forwards, futures, options (calls, puts, etc) and combinations thereof
  - Pricing of financial derivatives: Binomial trees, Black-Scholes
Assorted Topics in Construction & Evaluation of Actuarial Models

- Models of accident frequency: Binomial, Poisson, etc.
- Models of accident severity: Exponential, Pareto, etc.
- Impacts of deductibles, limits, and coinsurance rates
- Empirical models for loss amounts
- Estimating parameters using Maximum Likelihood Estimation
- Calculating the credibility of models
- Simulation of discrete and continuous random variables
Why become an actuary?
Actuary is consistently a top-rated profession for offering steady career advancement, high salary, work-life balance, and the opportunity to solve important problems with skill and creativity.
Actuaries are well-paid.

### Highest-paying Bachelor’s Degrees *(Source: PayScale)*

<table>
<thead>
<tr>
<th>Degree</th>
<th>Early Career Pay</th>
<th>Mid-Career Pay</th>
</tr>
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<tbody>
<tr>
<td>1 Petroleum Engine</td>
<td>$94,600</td>
<td>$175,500</td>
</tr>
<tr>
<td>2 Actuarial Math</td>
<td>$56,400</td>
<td>$131,700</td>
</tr>
<tr>
<td>3 Actuarial Science</td>
<td>$61,200</td>
<td>$130,800</td>
</tr>
<tr>
<td>4 Nuclear Engine</td>
<td>$69,000</td>
<td>$127,500</td>
</tr>
<tr>
<td>5 Chemical Engine</td>
<td>$70,300</td>
<td>$124,500</td>
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Actuaries are in high demand.

<table>
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<tr>
<th>Actuaries’ Expected Change in Employment (2016-26)</th>
<th>22%</th>
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<tbody>
<tr>
<td></td>
<td>2%  annual growth over a decade</td>
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<table>
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<tr>
<th>All Workers’ Expected Change in Employment (2016-26)</th>
<th>7%</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>0.7% annual growth over a decade</td>
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(Source: Bureau of Labor Statistics)
Actuaries experience steady career advancement.

Sample Career Path at a Consulting Firm

- Analyst
- Senior Analyst
- Consultant
- Senior Consultant
- Principal
- Partner
Actuaries enjoy steady and prolonged salary growth.

(Source: DW Simpson)
*Actuary* is well-regarded as a recession-proof job.

“In a time of economic risk, the use of an actuary is particularly appealing as the nature of their job is to help companies make decisions in order to minimize risk.

When evaluating areas of a business to trim, actuaries can be some of the most attractive people to employ.”

- Glassdoor
What does it take to become an actuary?
What does it take to be an actuary? You need to be good at math.

**B.S.**
A bachelor’s in a quantitative field is preferred for entry-level positions.

**3.0**
Minimum GPA requirement for most entry-level positions.

**2**
Actuarial exams recommended for entry-level candidates.
What does it take to be an actuary?

You need to be good at tests.

6 Exams to pass en route to becoming an Associate of the SOA.

3 Additional exams to become a Fellow of the SOA (Health Track).

6.5 Median years taken to achieve FSA designation (Source: ACTEX)
What does it take to be an actuary?

You need to get good at using a computer.

**Excel**

The spreadsheet program is the #1 tool for actuaries. VBA coding is a plus.

**SQL**

SQL is increasingly used by actuaries to query insurance claims data.

**R**

Actuaries build proprietary tools on the job using languages like R.
What's the difference between the SOA and the CAS?
The Casualty Actuarial Society (CAS) focuses on Property & Casualty Insurance.
The Society of Actuaries (SOA) does everything else:

- Group and Health
- Retirement Benefits
- Life and Annuities
- Quantitative Finance and Investment
- Corporate Finance and Enterprise Risk Management
What if I don’t know what field I want to work in?
It’s okay!

The two societies share three exams:

1. Exam P/1
2. Exam FM/2
3. Exam IFM/3F

You don’t have to choose a Society until after these exams, and most students graduate with only 2 exams!
Where do I start?
Visit authoritative websites for more info.

- For actuarial math at UCLA
  - Bruin Actuarial Society
- For more reasons to be an actuary
  - BeAnActuary.org
- For more info on life & health actuaries
  - Society of Actuaries
- For more info on property & casualty actuaries
  - Casualty Actuarial Society
Sign up for our mailing list.

- Sign up here.
- People on the mailing list are kept up-to-date on upcoming events and developments.
- Just since February, we’ve sent out open positions at:
  - Blue Shield of CA
  - Korn Ferry
  - Farmers Insurance
  - Aon Hewitt
Consider the Financial Actuarial Math major.

Benefits of the Major
- Take classes about topics related to actuarial work
- Courses are solid foundations for many of the preliminary actuarial exams
- Shows recruiters that you are committed to the actuarial profession

Other Potential Majors: Any Mathematics Major, Statistics, Economics, Business Economics

Minors/Specializations to Consider: Specialization in Computing, Statistics, Accounting
Consider how you can incorporate actuarial courses into your major.

- Many majors, especially in the Math Department, have electives that you can meet with actuarial courses.
- Begin taking coding classes to learn programming languages.
  - PIC 10A/B → C++
  - Stats 20A → R
Consider taking your first actuarial exam.

- **Study time required can vary.**
  - Recommended study time: 100 hours per hour of exam. The preliminary exams are 3 hours each, so start studying months in advance!
- **Exam P** is offered in **odd** months
- **Exam FM** is offered in **even** months
- The more exams you have, the more competitive of an applicant you will be during recruiting.
- You can sign up for an exam [here](#).
How can I get an actuarial internship for summer 2019?
Actuarial recruiting primarily takes place during the fall.

Be sure to hit the ground running once the school year starts. Here are some tips to make you a more competitive candidate:

- Try to pass at least one exam before September
- Brush up on Excel
- Join Bruin Actuarial Society’s mailing list after the presentation today
- Begin sending in applications during mid-September
And most importantly, ATTEND THE CAREER FAIR!!!

- Monday of Week 2 during fall quarter
- Send in your resume to be included in our resume book
- The Career Fair is a great place to meet firm reps and give them a face to pair with a name on a resume
- You only have one chance to make a first impression!
Thank you.