

Risky Business  
Spring 2019 Edition

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Dylan Kan

## **Non-Traditional Actuarial Roles**

An actuary has a strong background in mathematics, statistics, and business principles in order to measure and manage risk. Actuaries are self-motivated, great problem solvers, and able to work well in a group which are essential skills in any workforce. With such a background, actuaries can enter non-traditional roles such as in business analytics, enterprise risk management, and financial advisory to name a few.

### **Business Analytics**

Having a deep understanding of statistical analysis is crucial for business analytics. Being able to understand the data helps a business gain insight needed for decision making. Someone in business analytics should be comfortable at examining historical data and using statistical analysis to create models that predict future performance for possible changes that a business makes.

### **Enterprise Risk Management (ERM)**

As an actuary, identifying and calculating risk is a big part of the job, which is transferable to enterprise risk management. ERM consists of the processes and methods used by business to minimize their risks and their loss of capital and earnings. Similar to for actuary work, analytical skills are important for an ERM profession.

### **Financial Advisory**

Financial advisors work with clients to help eliminate financial risks and help them plan their finances for the long term. All types of financial planning and service can be done, which is why diverse minds with problem-solving skills are great for these roles. A financial advisor can work on different plannings such as investment, retirement, insurance, cash flow, and more.

No matter what path an actuary decides to take, they have the necessary and transferable skills and ability to learn on the job to succeed in non-traditional actuarial roles.

<https://www.actuaries.org.uk/practice-areas/risk-management/how-can-i-get-enterprise-risk-management-erm/non-traditional-paths>

<https://searchbusinessanalytics.techtarget.com/definition/business-analytics-BA>

<https://searchcio.techtarget.com/definition/enterprise-risk-management>

<https://www.daveramsey.com/blog/what-does-a-financial-advisor-do>

- Ana Linares

## Catastrophe Insurance and the 2017 Hurricane Season

The 2017 hurricane season was exceptional in the unprecedented amount of damage it dealt to coastal communities. The total costs of hurricanes in 2017, including Harvey, Irma, and Maria (collectively called the “HIM storms”), came out to \$306.2 billion, exceeding the previous record year of 2005 by 43% [<https://coast.noaa.gov/states/fast-facts/hurricane-costs.html>]. This is likely just the tip of the iceberg of damages to come, however, as many analysts and scientists predict that climatic, economic, and demographic patterns will lead future hurricanes to result in even more severe damages. Although the general economic risk posed by hurricanes is predicted to increase substantially, there is likely to be little change to the way the private insurance sector handles catastrophe insurance, while the public insurance sector is likely to see major reforms. This bizarre situation is due to the nature of catastrophe insurance in the United States, and the way categorical risks have been shared between private insurance and the government. Nevertheless, the unrepresented damages of the HIM hurricanes have resulted in innovation in the catastrophe insurance sector in the adjustment of claims, modelling of catastrophes, and orchestrating the increasingly prolific number of claims following major natural disasters.

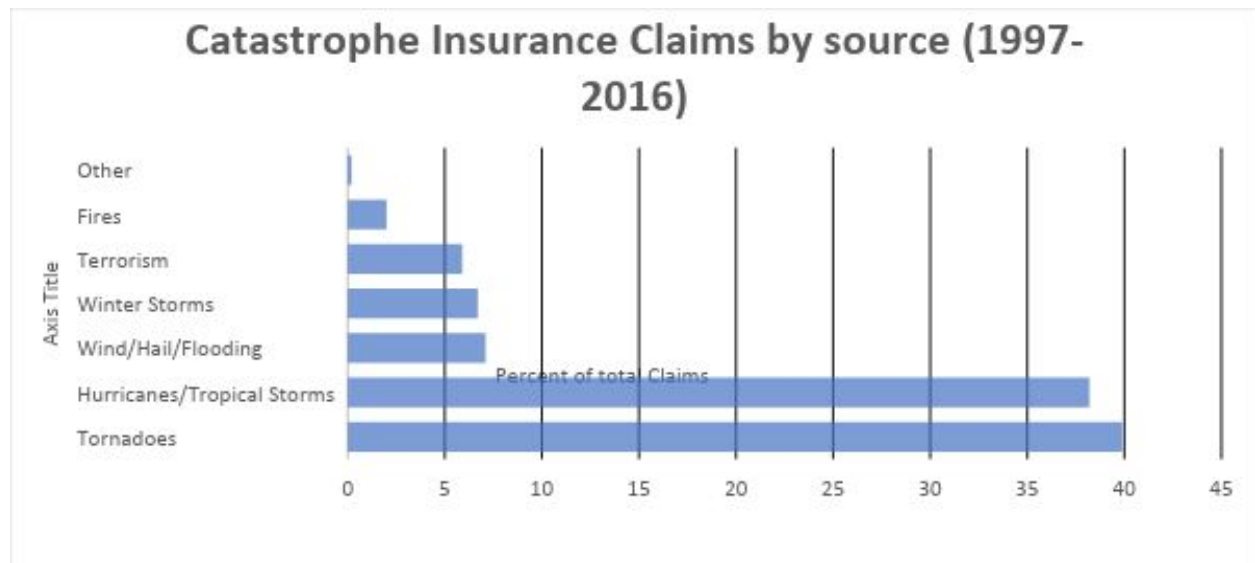
Hurricanes represent one of the most disastrous cataclysms in the United States. From 1986 to 2016, catastrophic loss from hurricanes was the second largest source of insured loss, coming in at \$515.4 billion over the 4 decade time period

**Most Costly Hurricanes in History**

Hurricane	Year	Cost
Katrina	2005	161
Harvey	2017	125
Maria	2017	90
Sandy	2012	71
Irma	2017	50

[<https://coast.noaa.gov/states/fast-facts/hurricane-costs.html>]. The 2017 hurricane season was no exception, and represented season was one of the most destructive years in history. Although hurricane Katrina remains the most destructive hurricane in U.S. history by economic cost, the HIM hurricanes each found a place on the top 5 list.

Source: <https://coast.noaa.gov/states/fast-facts/hurricane-costs.html>

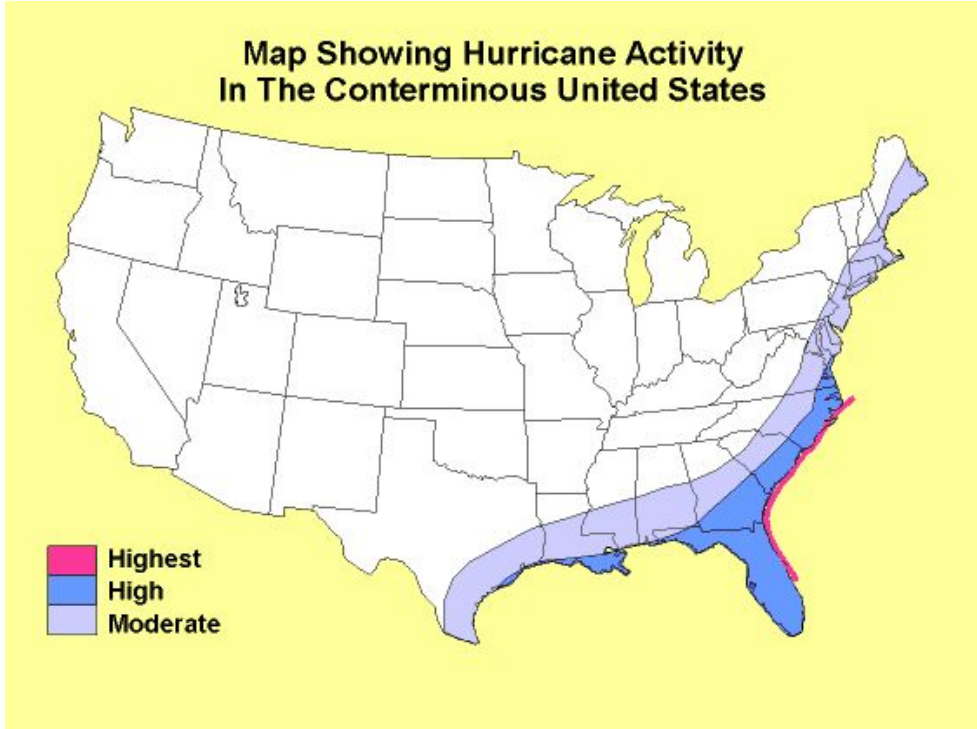


Source: <https://www.iii.org/publications/insurance-handbook/insurance-and-disasters/s-potlight-on-catastrophes-insurance-issues>

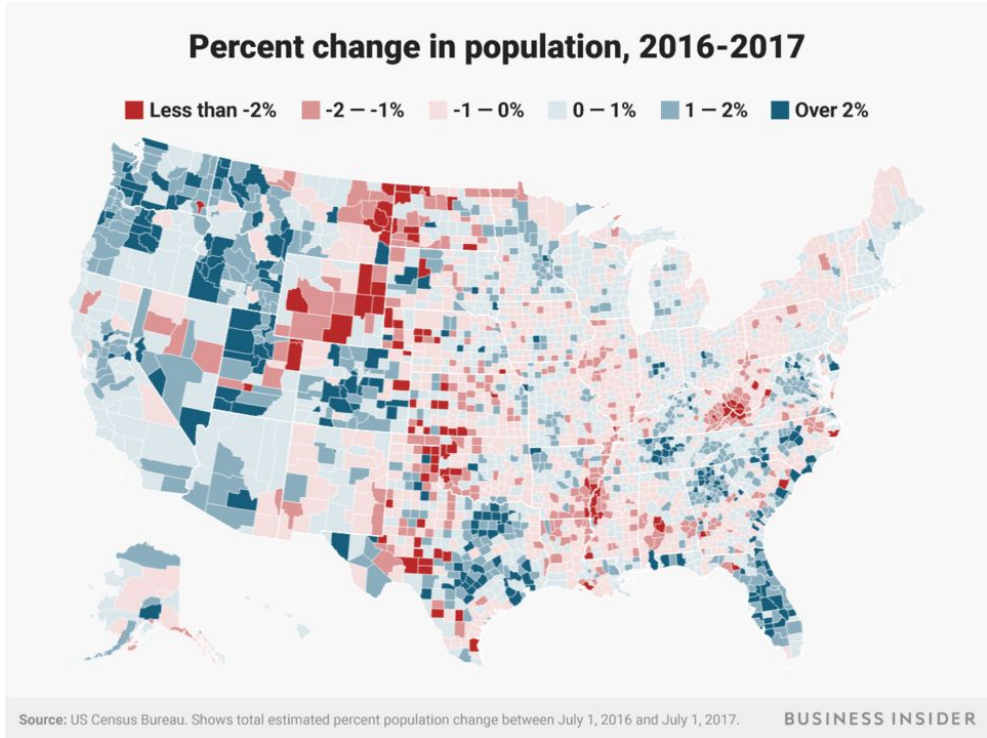
Although 2017 was the most costly year to date for hurricane damages, it will likely not be the most costly of the century. A number of trends are making the United States' coastal communities increasingly vulnerable to damage by hurricanes - namely, demographic shifts to coastal cities, and rising sea levels stemming from climate change. At the same time as some of the fastest growing communities are communities within 100 miles of the Atlantic Ocean or the Gulf of Mexico, a National Oceanic and Atmospheric Administration (NOAA) study found that ocean levels are rising approximately 0.13 inches annually

[\[https://www.insurancejournal.com/news/southcentral/2017/05/31/452704.htm?fbclid=IwAR2Ez75JBcLRa2JHcTCS\\_ne2l8ZCcXtnOoInY-Z3GpUbiunvmuSffqcd2UM\]](https://www.insurancejournal.com/news/southcentral/2017/05/31/452704.htm?fbclid=IwAR2Ez75JBcLRa2JHcTCS_ne2l8ZCcXtnOoInY-Z3GpUbiunvmuSffqcd2UM). Increasing sea levels will result in increasing damages resulting from higher storm surges during hurricanes and tropical storms, while global temperature rises increase the capacity for air to carry water, resulting in more rain (and by extension flooding) during hurricanes

[<https://www.gfdl.noaa.gov/global-warming-and-hurricanes/>].

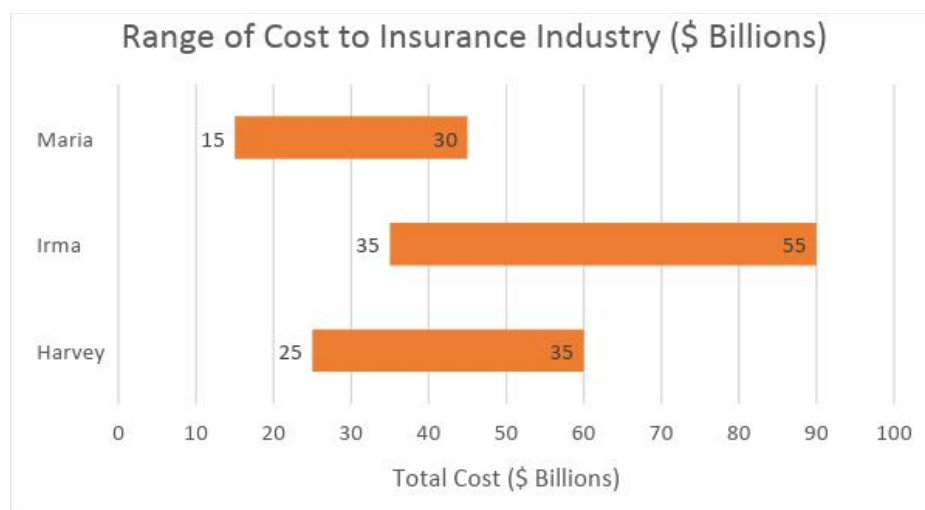


Source: <http://www.pitt.edu/~epi2170/lecture15/sld020.htm>



Source : [Business Insider/Andy Kiersz, data from US Census Bureau](#)

Although coastal communities will be at greater risk, insurance poses a method for the economics of hurricanes and tropical storms to be hedged against. Catastrophe insurance is the backbone through which the risk of hurricanes is hedged against at the regional economic level. As such, the ability for catastrophe insurance firms to fulfill its policy obligations and adequately manage the risk associated with hurricanes is of the utmost importance. The cost of the HIM hurricanes to the insurance sector in 2017 lies between \$75 billion and \$120 billion [Lloyd's Report].



Although Hurricane Harvey was the costliest hurricane to the region as a whole, Hurricane Irma represented the hurricane with the largest cost to the insurance industry [Lloyd's Report]. The reason Harvey was not the costliest hurricane in 2017 to the insurance industry, despite being the costliest to the economy as a whole, was because the primary cause of damage was flooding, which is very rarely covered under private homeowner's/renter's insurance policies. The only way for the average person to get flood insurance is through the National Flood Insurance Program (NFIP), which covers up to \$250,000 of damage to the structure of an insured home, and \$100,000 of damage to personal possessions [<https://www.iii.org/fact-statistic/facts-statistics-flood-insurance>]. These policies have historically only been available to those with property in NFIP-participating communities, which for the vast majority of communities, was limited to

those residing in the 100-year flood plain (i.e. where there is a 1% or greater risk of flooding for every year) [<https://www.fema.gov/national-flood-insurance-program>]. These 100-year flood plains informed by flood maps which are supposed to be updated by the Federal Emergency Management Agency (FEMA) every 5 years. Unfortunately, of the 22,000 communities for who FEMA manages flood maps, around two-thirds were out of date in 2017, with some of the communities most hard-hit by Harvey having maps over 15 years out-of-date [<https://www.bloomberg.com/graphics/2017-fema-faulty-flood-maps/>]. Of the over 200,000 homes damaged during Harvey, three-fourth were outside of FEMA's 100-year flood plains, and these completely uninsured against flooding damage [<https://www.thebalance.com/hurricane-harvey-facts-damage-costs-4150087>].

The greatest result of the 2017 hurricane season on catastrophe insurance has thus not been on the private sector, but instead the public - FEMA has announced plans to reform its policies for updating flood risk maps [<https://www.bloomberg.com/graphics/2017-fema-faulty-flood-maps/>], plans to overhaul its risk assessments to be at the individual property level, and seeks to implement a new rate structure by April 2020 [<https://www.wsj.com/articles/trump-administration-plans-flood-insurance-overhaul-11552950860>]. The Trump administration announced in March of 2019 that it seeks to reform the NFIP's government-subsidized flood insurance so as to take into account additional risk variables, adjust premiums to property value, and restructure premiums to address the \$16 billion of debt the program currently carries (debt which in large part is the result of payments made to the victims of Harvey, Irma, and Maria) [<https://www.wsj.com/articles/trump-administration-plans-flood-insurance-overhaul-11552950860>].

In the midst of the destruction caused by the HIM hurricanes, however, opportunities arose for the private sector to test novel approaches to prepare for, and then handle, insurance claims following catastrophic storms. Hurricane Maria saw insurers utilizing technology in Puerto Rico to overcome the destroyed infrastructure and a lack of adjusters to assess damages. In order to facilitate claims, insurers used satellite imaging and aggregated photos from social media networks to assess damages [Lloyd's report]. Hurricane Harvey offered insurers the opportunity to implement new aggregation



management tools to better hedge against supply chain and cargo risk. These tools were built using data collected following Superstorm Sandy, which caused significant damage to supply chains and cargo. Hurricane Irma, meanwhile, represented one of the most well-modeled hurricanes to date, and showcased the insurance industry's ability to model data from extraordinarily unpredictable events with relative accuracy. The private insurance sector has also increased its involvement in regards to issuing flood-insurance policies, particularly in areas where NFIP coverage isn't available, yet flood risks exist. Texas, for instance, an 838% increase in the number of surplus lines flood policies from 2014-2017, while Florida saw a more than doubling of the number of insurance companies offering flood insurance from 2017-2018 [<http://d1c25a6gwz7q5e.cloudfront.net/reports/07-13-18-Emerging%20Flood%20Insurance%20Market%20Report.pdf>]. As of 2018, private flood insurance constitutes less than 5% of all flood insurance policies, but the sector may prove lucrative for insurance companies looking to fulfill a demand that has only begun to be recognized in 2017.

To be sure, there are innumerable problems coastal communities of the future will face. As coastal communities become more populated all the while being more exposed to greater risk from the very shores in part responsible for their prosperity, catastrophe insurance will come to play a significant role in ensuring that communities will be able to recover from calamity. Through reforms to public insurance against catastrophic events, innovative methods for processing claims more efficiently, and ensuring risks are accurately accounted for in pricing, insurance will play a major role in ensuring that even three record setting hurricanes in a single year will not dampen the prospects of the millions of people who call the coast home.

- Abraham Peek ([abrahampeek@gmail.com](mailto:abrahampeek@gmail.com))

## The Elements of Computing Certificate

As a undergraduate student pursuing a math major with no prior experience in computer science, one might ask why they should pursue this certificate in the first place. At face value, it might seem that it only serves as a good resume booster in a world where the need for tech skills dominate the job market, but in addition to that, there is a lot more to gain from the experience as a whole.

The Elements of Computing Certificate provides valuable introductions and basic applications of computer science that lead to real skills that will apply to the actuarial path. For example, while taking M358K (or similar statistics class), having experience in Python will allow for a better understanding of how to use the software R. Perhaps even in a future career, a company adopts new software for work; given the previous exposure to similar languages or programs, adapting as an employee is much easier.

The certificate is fulfilled with 18 credit hours containing a curriculum of two base courses which serve as the foundation for the next four courses, which can more or less be taken in any order. As an actuarial student, the most practical classes to take will include skills that help working with data and understanding the data because of how they relate to modeling in the actuarial field. Despite this, any of the courses in the certificate can help develop skills in relevant areas or help explore other potential interests.

Some options for the four classes include elements of:

- Graphics and Visualization
- Mobile Computing
- Databases
- Data Visualization
- Programming Languages
- Software Engineering
- Web Programming
- Data Analytics
- Game Development

- David Heo

## **Exam Preparation**

Unlike other professions, becoming an actuary follows a series of rigorous actuarial exams which requires substantial practice and preparation. The first two introductory exams for becoming an actuary are Exam P and Exam FM, which focus on Probability and Financial Mathematics, and these exams are required for future actuaries regardless of area of focus. The Society of Actuary (SOA) recommends spending approximately 300 hours for each Exam P and FM; however, the number of hours you spend preparing depends on how familiar you are with the exam material.

The University of Texas at Austin offers courses that prepares you for Exam P and Exam FM which are: M362K and M329F. These courses cover almost all of the topics that are suggested by SOA exam rubric. Taking the two mentioned UT courses might be enough to receive a passing grade for introductory exams; however, it is recommended to purchase one of the following study manuals: ACTEX, Coaching Actuaries, or The Infinite Actuary which are high-quality exam preparation manuals that allows you to further understand the material on the exams. I personally enjoyed using the Coaching Actuaries study manual as it provides detailed explanations for each topic and you get to test your knowledge via ADAPT, which is a question bank that generates practice tests tailored to your level. Although purchasing the study manuals is not required, it is highly recommended as it allows you to further understand the concepts and increase your chance of passing the exams.

In conclusion, becoming an actuary is tough as it requires a deep understanding of mathematics, statistics and business management, and passing actuarial exams is not easy; one must be dedicated and well-prepared to acquire successful results. Hence, all students of University of Texas at Austin who are trying to become actuaries are required to take M362K and M329F courses, and should purchase a study manual prior to taking these introductory exams.

- Heonhui Lee

## **Introductory Actuarial Student**

Hesitance is the prime emotion that overwhelms any student who wishes to delve into something new, and in the case of a majority of college students, switching to another major encompasses this feeling. Last semester I was a BS mathematics major who felt content in my courses. However, there was always this underlying awareness that I could do better, do more with myself, so that rather than being merely content with my major, I could experience a genuine interest and joy within my work. It was only until after talking with my mathematics advisor that I came across the major of actuarial science, a topic that combines two of my personal passions: math and finance. With this newfound motivational boost and through the aid of personal research across various introductory websites I was ridding myself of this blanket of hesitance and taking my beginning steps into discovering what an actuary truly is. However, the defining feature that solidified my decision in joining the actuarial program was talking to the actuarial program director, Dr. Mark Maxwell.

When setting up a meeting to talk with Dr. Maxwell about the program, I was initially unsure whether or not to approach him due to my personal fears that I was already behind being a beginning sophomore student. However, when meeting with Dr. Maxwell, he welcomed my hesitance and was willing to answer each of my inquiries regarding the program itself, reassuring me that if I hold strong convictions and the motivation to put in a substantial amount of work into the program, then I was more than likely to succeed. This advice is necessary when it comes to taking one of the many, significant actuarial exams.

“The best indicator for a student’s potential success is their ability to prepare for an actuarial exam,” says Maxwell. “What a student does after he passes or fails an exam is telling of their character. This profession isn’t for everyone, you need to learn if this is the right choice for you.”

Rather than making the decision of whether or not I should pursue an actuary profession, he instead provided various characteristics that are important for a prospective actuarial student to have, in order to guide me along my own path of deciding myself if this profession is right for me. It is through this mentality of thinking, that I was able to

understand the depths of what an actuary is and how important the application of both mathematical and personal determination is needed to succeed in this profession.

“The three main characteristics of successful actuaries are ability, work ethic, and being able to communicate well with others,” says Maxwell. “Incredible students are able to meet all of someone’s expectations, whether it may be through their ability or experience.”

With this advice, my decision was clear. With each introduction on a new topic within the actuarial division, whether it may range from property insurance to my personal favorite, health care, I was more motivated to excel and become more informed in these areas of risk insurance. I implore any students who are interested in learning more about the actuary profession to first do their own research online, talk with your advisor or any actuary professional about the program, and take the initiative to join the actuarial science club to gain better insight and have hand on experience in various case studies and collaborations with other actuarial peers. Do not be afraid. This area of work may seem difficult, however, if you put a steady amount of work into comprehending the courses within the program and allowing yourself to branch out and experience actuarial activities with other prospective peers, you have the potential to succeed. If you are still hesitant in the program, take a risk! Whether it works out or not is your choice, you make the decision in the end. I, however, fully intend to continue in my pursuit for an actuarial degree, and I look forward to the future opportunities and experiences that have yet to come.

- Kathryn Robles

## UT Courses for Actuarial Science Students

When I first decided to attend the University of Texas as an actuarial science major, I was somewhat skeptical and nervous. Having already decided that I wanted to be an actuary, I knew the importance of the actuarial exams and I wanted to make sure that my school can properly prepare me for them. Since the actuarial science major is listed as an option under the mathematics major tree here, I wasn't sure whether I will be offered classes that are specifically meant to prepare us for the exams or not. Now as a second-year student here with SOA Exam P passed already, I can definitely say that my worries were unwarranted and the classes I took prepared me very well for the exams so far.

Coming into college, I already had AP credit for calculus 1 & 2 so all I had to take to finish my calculus requirements were M408D (sequences, series, and multivariable calc.) Once I finished with my calculus requirement, I was able to start taking my first actuarial related class. I took M362K (probability I) my second semester here and although Probability I covers all the material needed for SOA Exam P, it wasn't a class made specifically for actuarial students. Some professors will prepare you better for the SOA exam while others might focus more on the general concepts as there are a lot of non-actuarial students taking this course. If you have the option, I highly recommend that you take probability with Professor Maxwell. Professor Maxwell is the director of the UT actuarial program and his class will be extremely beneficial to anyone that wants to be an actuary. In his probability class, he emphasized the importance of understanding the material over simply cramming for a good grade. Professor Maxwell also shared a lot of tips and techniques that became a huge asset for me when I took the SOA exam.

After my taking Exam P, the next exam on the list was Exam FM for financial mathematics. Between these two exams, I had to take a few general math classes such as discrete mathematics, linear algebra, and applied statistics. After I finished those classes, I started taking theory of interest (M329F) which is specifically designed for students preparing for Exam FM. This class covers all the materials needed for the exam and is designed to prepare us for it. I haven't taken the exam yet, but I feel like the class is

preparing me for it very well. The classes and the professors at UT are the best there is and can be a huge asset in the pursuit of becoming an actuary.

Being an actuary requires a vast amount of knowledge in mathematics as well as many other areas such economics, business, and more. To get the actuarial science degree, we are required to take many business classes as well such as accounting, micro/macro economics, and finance. A lot of these business classes count towards the VEE requirements so by the time you graduate, you will already have that done! Since a lot of these classes can count towards the business minor requirements from the McCombs School of Business, a lot of actuarial students also graduate with a business minor. The actuarial major at UT incorporates an interdisciplinary field of studies and provide students with a vast amount of knowledge. This is why I consider the actuarial program at the University of Texas at Austin to be one of the best in the world.

- Myron Yang

## **Case Competition**

Thank you to Mercer for sponsoring our Spring 2019 Case Competition on retiree medical. It would not have happened without the involvement, help, and support from Alisa Walch, Mercer mentors, as well as the panel of judges. Congratulation to the 1st place team: Kalyani Limaye, Elena Zhang, Ibrahim Janney, Nina Hunt, Myron Yang, Yizhen Jia and the 2nd place team: Vrinda Rajkumar, Madison Jaeger, Heonhui Lee, Xinran Zang, Maxon Chu, and Tyler Nguyen. Their dedication, creativity, and passion showcase the best of UT Austin's actuarial science students.

More importantly, the competition provided a memorable and practical experience to actuarial students wishing to pursue the profession. To most participants, it served as an introduction to healthcare in general and Medicare in specific, and in doing so it provided a glance at a real-world problem that actuaries face. Furthermore, it allowed students to put into use the materials acquired from actuarial classes, as well as practice their analytical and communication skills in a professional setting.

A quick recap: Mercer's case competition brought attention to the uncertainty and sustainability of Medicare. Each team had to first realize current problems that the Medicare system is facing, then propose a set of possible, pragmatic and direct solutions in order to stabilize Medicare for the near future of retiring Americans. Participants' research and propositions were then presented to a panel of judges composed of working actuaries. Students not only received feedback on the competition's topic and idea, but also constructed criticism as well as advice on future projects and professional endeavors.

In the end, the competition provided valuable experiences to students as well as an opportunity to connect with working professions. Participants got a chance to interact and learn about details of the profession from those who are accomplished and experienced in the field. Together, the event made a lasting impression on UT's actuarial science students in giving them a chance to experience actuarial work, which would help them in their progress on becoming a working actuary.



Again, it would not have been possible without Alisa Walch, Mercer, participating mentors, judges, and students. A big thank you to all for coming together for this competition.

- Tyler Nguyen

# SPRING 2019 Actuarial Scholarship Honor Roll

## Endowed Scholarships

Mark and Pamela Callahan Presidential Scholarship in Actuarial Studies

Anqi Lou

Jim and Ann Daniel Endowed Scholarship in Actuarial Studies

Ibrihim Janney  
Justine Meyer  
Xinran Zang

James Morris Dial Endowed Scholarship in Actuarial Studies

Tomas Venegas

Bruce Fuller Endowed Presidential Scholarship in Actuarial Studies

Dylan Kan  
Victoria Li  
Bo Yu

Kim Lee Endowed Scholarship in Actuarial Studies (Through Texas Exes)

Keyi Ma

John S. Rudd Jr. Scholarships in Actuarial Studies

Warren Lee Bello

Eugene Wisdom Memorial Scholarship in Actuarial Studies

Lingyun Gu

Recurring Scholarships

Actuarial Club of the Southwest

Shirel Miller

Milliman Standard of Excellence Actuarial Scholarship

Paul Cessna

New Era Life Insurance Actuarial Scholarships

Byunghun Han

Shifan Hu

Rudd and Wisdom Actuarial Studies Scholarships

Lee Bello

Samantha Cantor

Lauren Case

Paul Cessna

Earl Maisonneuve

Steven Place

Cole Rank

Evan Shresta

Tomas Venegas

Noah Villalobos

Southwest Actuarial Forum

Yuwei Wang

USAA Life Actuarial Scholarship

Zhijun Zhang

Vijith Govathoti

USAA Property and Casualty Actuarial Scholarship

Ziqi Li

Reimbursement of Exam Fees for Centers of Actuarial Excellence (CAE) and Universities and Colleges with Actuarial Programs-Advanced Curriculum (UCAP-AC)

William Biediger	IFM
Pablo Bribiesca Sanchez	STAM
Noah Villalobos	STAM