

# THE ACTUARIAL SURVIVAL GUIDE

A comprehensive guide on how to survive and thrive in the treacherous world of actuarial math

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## **SECTION ZERO** an introduction

### Preface

If you've ever read the Adventures of Tom Sawyer as a kid, you may recall the scene where Tom is lost in a dark cave. The novel describes his feeling of a lack of direction – an inkling that finding light was a futile pursuit at times. Suddenly, Tom comes to the realization that he was carrying candles in his back pocket all along. The candles allowed Tom to gain a greater awareness of his surroundings; it helped him avoid bumping into obstructing rocks, it guided him in the right direction, and it ultimately led him to finding the light... Think of the Actuarial Survival Guide as the candles that you carry in your back pocket. The light, under this analogy, represents the overarching goal that unites us all – landing a full-time job.

This guide will oscillate between absurdly analytical and gutlessly straightforward. It will even challenge the bounds of political correctness at times. We wanted to write this guide in the same way that we would give advice to a close friend.



#### A Quick Note about the Writing

Writing this type of stuff is actually harder than it may seem. You need to consciously try striking a balance between providing hope while also being realistic, displaying confidence in conjunction with humility, all the while remaining as authentic as possible. If you feel the writing is off-putting or our opinions are downright incorrect, let us know! This is simply a first iteration, and as such, we would love to hear your feedback so that the guide can be continuously improved over the coming years.

### How to Use This Guide

I would recommend reading the entire guide all at once *right now*, perhaps while skimming the sections that don't apply to your situation. This will provide you with a solid roadmap to help guide you through your university journey. So sit somewhere comfortable, grab a big ole' cup of coffee, and get ready to start mentally drawing your actuarial roadmap!



Oh, and just as Tom Sawyer's candles occasionally ran out and needed to be replenished, you will find that the knowledge you've absorbed through the first read of this guide will eventually begin to fade over time. For the reason, it is imperative that you revisit the guide periodically, as needed. This is a concept called Just-In-Time learning. Under this philosophy, it is thought that the optimal time to learn something *right before you need to use the knowledge.* For example, you may want to open up this guide before you sit down to write your cover letters.

Alright so I've used the pronoun "I" multiple times so far. Including this last sentence. You're probably pretty confused at this point, since there are two authors. You don't know which face to visualize as you're reading this.

Maybe you've even been conjuring up disturbingly nauseating images such as this one:



Since "I's will be used throughout the guide, let's clarify – once and for all – who authored which sections.

Section 0: An Introduction – Cedric

Section 1: Landing your Dream Job – Cedric

**Section 2: Surviving University and the Exams** – *Cedric (with contributions from Devin, Serge Buda, and Martin Marion)* 

Section 3: The Actuarial Profession in a Nutshell- Devin

There. No more Ced-vin induced nausea.

## You Are an Optimization Problem

People define success in this program in different ways. Many students consider the ultimate victory to be landing their dream job after graduation. Others measure it based on how much fun they've had. Let's hope it's a combination of both of those things.

Some believe that in order to land your dream job, you have to be smart, or inherently talented in some way – and working hard is secondary. But a glance at the following (mathematically proven) 3-D graph should shed light on this fallacy.



#### Figure 0.1 The effect of effort and talent on an actuarial student's potential

Ok, after you've finished chuckling about the ridiculously analytical nature of this graph, try observing all the characteristics of this 3-D curve. One thing you'll notice is that hard work has a much greater bearing on success than inherent talent. That is the beauty of the actuarial profession – regardless of inherent ability, you can achieve success by working hard and focusing your energy in the right areas.

Also, observe the stooping nature of the curve on the left-hand side. This shows that there *is* such thing as working "too" hard – that is, too much effort may result in decreasing success after a certain point. If you devote too much energy to things like studying, you'll be missing out on *fun*, thereby making you less "successful" in the broader sense of the term. Anyways, you are an optimization problem – so optimize yourself!

Oh, and by the way, one key factor was intentionally left out. That is, your potential is determined by something other than effort and talent – can you guess what it is?

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Well, if your potential were a mathematical equation, it would probably look something like this...

Potential = 
$$(Effort)x \begin{pmatrix} Inherent \\ Talent \end{pmatrix} x \begin{pmatrix} The right tactics \\ and strategies \end{pmatrix}$$

This guide can't make you work harder though. And as far as I know, electronic PDFs can't alter your DNA. What this guide *can* do though is equip you with the right tactics, strategies, and shortcuts that help you maximize your potential, while maybe even decreasing the work you may need to put in. Here's how the Actuarial Survival Guide fits into the equation...

 $\binom{\text{The right tactics}}{\text{and strategies}} = \int_{First \ day}^{Today} \left[ \binom{Univsersity}{experience} + \binom{Mentorship}{relationships} \right] dt + \binom{The \ Actuarial}{Survival \ Guide}$ 

So hopefully now you're at least somewhat sold on reading the rest of the Actuarial Survival Guide. Or not. Either way, you've read up to this page so that's a good sign.

## SECTION ONE landing your dream job

by Cédric Gousseau

## Landing Your Dream Job (or any job, really!)

**The Goal** – A common fallacy is that every time you get a job offer, you're taking a job away from somebody else. In reality, if more people from University of Manitoba meet the standards, *companies will extend more offers.* The ultimate goal for this section is that every U of M student gets a job offer, or at least that we move in that direction.

**Defining the enemy** – If I want everyone to get a job, who are we taking these jobs from? In short, other schools. Most notably, let's take jobs away from those Waterloo shmucks (*WS*). If *WS* are the enemy, how do we outdo them? By becoming *excellent* at the key steps in the recruiting process;

- 1. Crafting a cover letter
- 2. Writing a resume
- 3. Attending info sessions
- 4. Interviewing
- 5. Sending follow-up emails

This process is reminiscent of the TV show Wipeout. Every step presents an obstacle. Even if you've made it past the first three obstacles, you can get knocked down by the interview and get eliminated. All your previous efforts go down the drain. Therefore it's important that you perform your very best in all five areas. Let's look at how to become *excellent* at each of these steps.



## **1. The Cover Letter**

There is no prescribed method to crafting a cover letter. In fact, unique formats can make you stand out from the crowd. However, there are several components that make up a strong cover letter, regardless of its format. I think the best way to illustrate these components is through an example I made (next page).

By the way, if I were to self-assess that cover letter, I'd give it an 8/10ish. Although it's well-written and has all the crucial components of a good cover letter, it's a little too wordy and contains some extraneous information.

As you read through it, be sure to read the notes corresponding to the circled numbers.

Dear

4

I strive for excellence in my work performance, leadership initiatives, and academic life. I have proven leadership capabilities, exemplified by my success as the on the

	and as the	
. Additionally,		in

my fourth and final year.

As an actuarial intern this summer, I was curious to uncover why I was working on certain projects and how my work tied into the company's strategic objectives. Asking questions helped me develop an understanding of the big picture, and a greater sense of the evolving role actuaries play in life insurance companies. As a forward thinking individual, I believe that understanding why a company undertakes a project and how it impacts other divisions is important to the success of the project.

With a proven track record as a high performer, I am a smart creative with solid analytical and computer skills, complemented by strong interpersonal skills and a curious mindset. Most importantly, I have a fervent desire to grow professionally and believe I have the potential to become the actuary you are looking for in the future. I am very inclined to pursue a career at

V I would be very enthused to meet with you to further discuss opportunities at \_\_\_\_\_\_. Thank you for your time and consideration.

- 1. Display your *enthusiasm* for the company
- If you know anyone who has worked at the company, use this to your advantage – this shows that you're interested enough to speak with a past intern about the company. You may even want to mention their name.
- 3. Demonstrate your *knowledge* of the company. This shows that you've taken the time to research the company, and they greatly value this.
- 4. Brag. Humility has no place in cover letters. Tell them straight up why they should want you.
- 5. You could expand on one of your notable strengths. This one isn't necessary at all in fact, this section is redundant and probably a weak spot in the cover letter
- 6. Include any other information that makes you a more attractive candidate. If you are applying to an internship outside of Winnipeg, you can mention that you are willing to relocate after graduation (if this is true), which can make them view you as a better long term investment. Or, if you currently have no exams passed, you can use this opportunity to say that you are planning to sit for an exam at a specific date.
- 7. Pretty self-explanatory I think!

## 2. The Resume

This is the meat and potatoes of your application package. The actual content of your resume is far more important than the way it is formatted, so this section will look at content exclusively. If you're in need of help on how to make your cover letter *look pretty*, I'd recommend booking an appointment with the Career Development Centre.

Alright so to simplify, the strength of your resume can be determined by four main factors. Here's the estimated importance of these factors and how they vary over time.



#### Figure 1.1 The evolving importance of resume components

Keep in mind the inherent subjectivity of this graph. However, despite the roughness of these estimates, they can give you an idea of where to focus your energy. If you find that you are weaker in any specific area, you may want to take action in order to balance out your resume. For instance, if your extracurricular section is lacking, get involved with UMAC! ;P

It can also be useful to look at the trends here. For instance, notice the decreasing importance of grades. This highlights the importance of clutching a high GPA early on in your university career.

Devin is the info session extraordinaire. In fact, he goes to every single one, and has admittedly gotten job offers solely based on attending them. So it only made sense that he writes this next section!

### **3. Attending Info Sessions**

By Devin Kinley

#### What to expect

For those new to the info session scene, these employer-sponsored networking events are a platform for companies to sell themselves to you. Conversely, making a good impression can give you bonus points to help you get to the interview stage. There is basically no downside risk, so attend as many as you can.

The average info session will consist of a 30-minute presentation about the company and an hour or two of networking (and maybe food & drinks!). The dress code is typically business casual (dress shirt, dress pants), though you won't feel overdressed if you throw on a suit.

As for the social layout, there will typically be one employer in a circle surrounded by 2-10 students. The larger circles don't really feel like a normal conversation but rather like a question period at a presentation. Students will take turns asking questions and the employer will elaborate on an answer. The smaller circles (which you should aim to be a part of) are much more like a conversation.

If done correctly, going to info sessions can dramatically increase your odds of getting an interview, especially if you can demonstrate two major things:

- 1. Your desire to work for the company
- 2. Social skills

So how can one convey these two messages?

#### Large Circles

Having a good conversation with an employer is much easier than you would think, especially in a large circle. It can help to come prepared with a few memorized questions that you could ask any employer. Ex: "What do you do as an actuary?". This isn't rocket science; just have a number of conversation starter questions and flow with the conversation. The best thing about the large circles is when you ask one question, the employer will speak directly to you for a couple of minutes. The employers are talking 95% of the time; all you need to do is ask some questions so that the employer spends all that time speaking directly to you. This will result in you demonstrating social capability and you will be significantly more memorable to the employer. Being more memorable will increase your chances of receiving an interview and if you do get an interview, the ice will have already been broken at the info session.

#### Small Circles

Small circles are much harder than large circles, however when the opportunity presents itself you should always move towards smaller circles. Smaller circles are much more like a normal conversation and are a great opportunity to create a real relationship with an employer. Remember, employers aren't just looking for the most intelligent and strongest candidate, they are also looking for someone they can have a good conversation with by the water cooler. The only reason small circles are harder is because you can't fake being a good conversationalist here, you must actually converse with the employer.

#### **Business Cards**

Business cards can be useful. If you get business cards, try not to come off as a sleazy used car salesperson. The benefit of distributing business cards is that employers are more likely to remember your name. The downside of business cards is they can leave the employer with a potentially negative view of you if you present your card at the wrong time in the wrong way. If you've exchanged business cards you can use them as follows.

At the end of the evening, send a short thank-you email to the employer you connected with best. Remember to reference something you talked about in your conversation in your email.

#### Additional Tips

- Speak to as many employer representatives as possible. Some companies, like Sun Life, will record how many people you spoke to.
- Try to find out who is doing the interviews and who is making the hiring decisions.
- Try not to "talk shop" (talk about working) all night. That being said, you should feel the conversation and decide where to go with it. Some employers only want to talk about work.
- Don't be fake
- If you are trying for a job outside of Winnipeg, express your desire to move (if it's true). The main concern for these companies is that they will invest in you as an intern but you will never return for a full-time position
- Try to be one of the last people in the room but not the last one. The longer you stay, the more people leave and the smaller the circles get making you much more memorable. However, if you are one of the last 5 people in the room the employers may start to resent you because you are keeping them from going home
- Never talk about salary
- Never self-deprecate (unless this is done with a humorous intention)
- Never speak ill of any individual or company

## 4. Mastering the Interview

If you've landed the interview, you've been passed the basketball. Nice. Many people, when they reach this point, decide to simply pull up and shoot. What they don't realize is that they're firing *from way beyond the arc over multiple defenders*.

What they should be doing first is take a defender "iso" and advance as close to the basket as possible. And that only comes with *interview preparation*. If you've prepared well and you are using the right tactics, you might even be able to blow by your defender and position yourself for a layup.

Keep in mind that the job offer will not go to the individual who is best at performing the job. The job offer will go the individual who *does the best interview*. Historically, this is where U of M students have had an advantage over *WS*.

#### Preparation

Interview preparation is where you have the greatest control. Many students neglect this part of the process, opting to rather expend all their energy finding the perfect font for their resume. Don't be one of those students.

Ideally, the first part of your preparation should start even before you get asked for an interview – you should try and connect with your interviewers at the company info session or at the Fish Dinner. Not a necessity but a nice bonus!

Now, it is important to prepare for common interview questions. Go through a list of common questions and form a response in your head for each one. The CDC has a decent list for this purpose. If you are unclear as to how you'd answer the question, it might be helpful to brainstorm and write down what you'd like to say.

Next, develop your anecdotes. Interviews these days will typically have a few behavioural questions, à la "Tell me about a time when...". I think it's a pretty terrible way to evaluate candidates but I guess that's just how the cookie crumbles. Just as you can classify most Hollywood movies into <u>five generic plots</u>, you can classify behavioural questions into approximately five main categories.

- 1. Leadership
- 2. Prioritization/Time Management
- 3. Decision Making
- 4. Problem Solving
- 5. Communication

If you think of at least one personal anecdote in each of these categories, you'll be armed for virtually any behavioural question.

It is also crucially important that you research the company for which you are interviewing. Look up their mission, values, key facts, maybe even see if they've appeared in the news recently for any reason. If you really want the job, you may even want to spend hours doing this type of research. Finally, prepare your end of interview questions. Interviewers will always ask you, at the conclusion of the interview, whether you have any questions for them. The worst response you can have for them is "no". Prepare at least two or three questions that demonstrate your knowledge and interest in the company. Bonus points if you can ask a question based on something they've said in the interview.

#### The Interview

I'm going to skip over all the basics such as "give a firm handshake and look the interviewer in the eye" – if you're looking for the fundamentals, one word: Google. But beware, I find that much of the advice doled out by the internet is garbage. Instead, I'll share with you two of my most potent tips.

One of my favourite tactics is to ask questions *throughout the interview*. This can be useful as it demonstrates that you've been paying attention and that you can process new information quickly. Portraying this "hard to get" attitude can offer many benefits, but should only be used if you're feeling very confident.

At the end of the day, as cliché as this may sound, I really do think it's best to be your authentic self in the interview. Yes, you should definitely prepare, but faking it won't get you too far. And there's science to back up that assertion. When you try to put on a face, you need to match your body language to the words your saying. So you find yourself expending energy not only to make up lies, but to try and have cohesive body language as well. It doesn't take much EQ for an interviewer to detect this. The rational part of their brain may conclude that you're a great candidate, but their gut will tell them something's wrong. Most often, their gut is what you want to win over. The entry-level actuarial position is not commoditized – recruiters are looking for real people.

## 5. The Follow-up

Sending a follow-up email after your interview probably has the best

 $\frac{\Delta Pr(Getting the offer)}{Effort}$  ratio out of any step in the interview process. Don't miss out

on your chance to seal the deal!

Here's a follow-up up email example I made, denoted with the key components which make up an effective letter:



- 1. **The Expression of Gratitude.** Perhaps the most standard and obvious component, but it is nevertheless important that you do not omit this.
- 2. **The Personal Touch.** This is what separates the junk-worthy email from the star-worthy email. Here, you want to reference a memorable part of your interview and show that you appreciated something they said. Done well, the recipient will be reminded of a high point in your interview, and they will recognize that you were actually paying attention during your interview.
- 3. **The Reinforced Interest.** Finally, restate your interest and provide a valid reason as to why you want the job.

#### A note on the CDC

The Career Development Centre (CDC) is a massively underutilized service at the Asper School of Business. They can measurably increase your odds of landing a job by providing the following services:

- 1. Cover letter review
- 2. Resume review
- 3. Practice interviews

You should exploit the CDC as much as possible (I mean that in the least conniving way possible). They are trained and experienced at helping people land jobs, and you're paying their salaries through your tuition, so take advantage!

You do have to be an Asper student but **you do not** need to be a Co-op student to take advantage of these free services. Simply log onto your <u>Career Portal</u> account online and book an appointment.

Also note that WS do not have such a service, so this is an advantage you have over them.

#### Widening Your Net

It goes without saying that you should try applying for all actuarial positions posted on the Career Portal. But why not cast a wider net?

The reality is that Career Portal jobs are only the tip of the iceberg. There are thousands of actuarial opportunities across the world that aren't affiliated with the CDC. Many U of M students get job offers from non-affiliated companies every year. In my opinion, that number could be much higher if more people made such an effort.

It is highly recommended that you apply to non-affiliated companies, especially if you are looking for an out-



of-province experience. Where can you find such job postings?

Actuarial internship and full-time opportunities are posted all year round. You can find these jobs on any major job posting website.

ASNA is another great opportunity to find non-CDC opportunities. ASNA is the largest actuarial conference in Canada, held in a different city each year. Many University of Manitoba students have received employment opportunities through this conference.

## **Crushing the Internship**

During my first internship, I'll be perfectly honest and tell you that I was way too focused on (admittedly unfruitfully) trying to be a productivity extraordinaire. Although I loved hanging out with the intern crew, I saw work as an insurmountable mountain that I needed to climb every single day, only I could never reach the peak – I could never reach my desired productivity. How unsatisfying is that? Very. The company was great, my projects were great, *but my approach was terrible.* 

I learned from that experience that the best piece of advice is to have fun! Because when you have fun, something magical happens: *you actually become more productive and motivated.* 

If you follow that *one* piece of advice alone, I can basically guarantee that they will want to hire you back. However, let's go further than that. Why?

Because I am a firm believer in the merits of slaying the internship.

I think crushing the internship provides more benefits than meets the eye, such as:

- Boost career prospects through better reputation if you were to come back to the company on a full-time basis
- More leverage when negotiating a full-time employment contract
- A great way to learn and grow
- It's more fun

Ok so let's look at the three main ways in which a typical company might evaluate you, and the approximate weight distribution:



#### Culture Fit

With the stacking evidence that workplace culture can play a pivotal role in company performance, it comes to no surprise that people care about how well you get along with others. There isn't much practical advice to be given on this subject, besides some basics:

Throughout the work term, make an effort to get to know as many people as you can on an individual basis. Most importantly, be sure to participate in as many company events as possible, and socialize with the full-timers.

#### Presentation

Many internships require its participants to deliver presentations at the conclusion of their internship to discuss what they worked on, what they learned, etc. This platform is easily your greatest opportunity to showcase your skills and potential. A strong performance displays your communication skills, shows that you've achieved a lot over the work term, and that you *understand* your work and how it fits into the bigger picture. These are precisely the skills recruiters are looking for in potential full-time hires, hence its importance. No pressure. Now I have a gift for you. Here's a link to an actual presentation I made.

#### https://drive.google.com/open?id=0ByDj1Tyo\_QldeUN3aHFSRkxMSWs

I was very reluctant to include this for reasons including company privacy... But then I realized how much I wish I would've had something like this in my preparation!

Some confidential information has been deleted but all the content is there, including every single word I said in the presentation, found in the speaker notes.

This presentation should serve as a valuable guide as it was very well received (if I do say so myself). Of course, no presentation is perfect – it has a couple shortfalls which I will point out later. I recommend you open the PowerPoint file to follow along with the commentary below.

You want your presentation to achieve 3 things. Here's how to achieve these.

**1. Teach them** – Much of your audience is there by necessity, and they aren't expecting to get much out of your presentation. If they can actually *learn* something from your presentation, they will be very pleased.

You should teach your audience concepts that will help them better understand your project(s), as shown by **Slides 3-8**. My advice here is twofold. First, pretend you are explaining the concepts to your grandma (not to discriminate against grandmas but they tend to have limited actuarial knowledge... sorry FSA grandmas!). Second, use analogies – much easier to follow and much more engaging.

**2. Showcase your work** – Without explicitly bragging, you should show off the impressive work you've done over your work term!

Now that my audience had the necessary background information, I was able to present about my work in *Slides 9-19*. Note the strong visual appeal and limited text. Avoid "point form" if possible.

Show off wherever you can. For instance, in *Slide 18*, I noted that I created a very powerful function with high accuracy.

The most important slide in my presentation was **Slide 19**. It is impressive if you are able to discuss how your project has impacted the company on a big picture scale.

**3. Entertain them** – this can come in the form of strong presentation skills (good vocal tonality, gestures, posture, fluidity, etc), but it can also very useful to add humour to keep your audience engaged.

You may find that humour works best when placed at the beginning and end of your presentation, as I did in my presentation. If you have lots of humorous content, you can inject jokes throughout your presentation. My presentation falls

short in this regard – I only had jokes at the beginning and end. Probably because I wasn't funny enough to think of anything more.

**Note:** The content above is written specifically for actuarial internship presentations. I have chosen to exclude any generic advice about presentation skills because you can (and should) find this online or from co-workers. Don't overlook this – content is important but delivery is the greatest determinant of overall performance! (probably 50%+)

#### Work Performance

Being a high performer is actually pretty easy. There are a million tips on how to perform well at work, but if you focus the following three things, you will probably be considered an outstanding performer.

**One.** The best way to impress is to **underpromise and overdeliver**. If your boss asks you to make a Sunfire, *build a Cadillac*. The bells and whistles matter.

Remember when I told you that during my first internship I was making a colossal effort to be ultra-productive? Well, I also made the crucial mistake of setting impossible goals in front of my manager. Not a good combination. I was *overpromising and overdelivering.* 

So for my next internship, I decided to set *realistic* goals. This simple made a *huge* difference.

**Two. Write excellent emails**. Many of your co-workers, especially those with whom you have limited interactions, will base their opinion of you on the emails they get from you. If you get into the habit of writing excellent emails, your reputation will thrive. Be intentional about improving the clarity, flow, and conciseness of your emails.

**Three.** Ask questions. Especially big picture questions. I'm sure you've heard it a million times. However, as with most overused rhetoric, you probably haven't fully internalized its importance. Here are the underlying reasons for which it can be beneficial, even imperative, to ask questions. First, it displays intellectual curiosity, a highly sought after competency in today's workplace. Next, you'll spend less time pondering, thereby boosting productivity. Finally, you'll *actually learn*, and gain a better understanding of your project, which will be helpful for you presentation.

#### Bonus - Crafting a Personal Brand

If you've nailed down the other aspects of being a good intern, a more advanced tactic is to try developing a personal brand. This can come in many forms. For instance, if you have strong VBA coding skills, you could position yourself to be the go-to person for any co-worker in need of help with their code. The goal here is to make yourself indispensable to your team. If you deliver tangible value on a consistent basis, your reputation will reflect this. This isn't essential but can get you major bonus points.

#### Networking

Networking. Bleh. If you hate that word as much as I do, it probably triggers an image of a sleazy salesman talking your ear off with his deep suave voice while flashing his business card. It can seem very contrived. But it doesn't have to be.

Your best bet is to try to get to know people at company events, but there are plenty of other opportunities to meet full-time staff. If you meet someone interesting, and there is a *natural* opportunity to do so, ask them for lunch or coffee! If you have a genuine interest in them, they will be usually be flattered by your request.

But beware as this can backfire. First instance, if you bump into a VP in the bathroom on your first day and ask them to lunch, you will be seen as a gunner (look it up on urban dictionary). Don't be a gunner. Having *natural* interaction and progressions is key.

Having personal relationships with managers and executives can lead to fruitful mentorship relationships, and other great opportunities!

## **SECTION TWO**

## surviving university and the exams

by Cédric Gousseau

With contributions from Devin Kinley, Serge Buda, and Martin Marion

## An Introduction to Ultralearning

Before diving into exam related stuff, let me tell you about ultralearning; the science of studying minimization.

One of the most useful endeavors Devin and I have embarked upon over the past year has been our attempt to minimize the time we spend studying. I think this is a goal everyone should strive for, and the reason is simple – less time spent studying means more time spent doing things that are more fun than studying.



#### Figure 2.1 Time allocation of normal students vs ultralearners

It would be no stretch to say that we've probably decreased our average time spent studying by 2-3 times while maintaining the same level of grades. We hope you do not see this as a boastful proclamation, but rather that it serves as an impetus to join us on the ultralearning bandwagon.

#### The Yin and the Yang of Ultralearning

There are two separate but complementary approaches to achieving the ultralearner status. There are *external factors*, and there are *internal factors*. External factors are quite broad and include anything that impacts your mental capacity. Internal factors include the strategies and tactics you use when studying.

Let's explore these two facets of ultralearning and how to optimize each one.



#### External Factors

Imagine you've got a heavy midterm in two weeks. Since it's so far away, you decide to push back your studying by one day. And another. And another... Until you only have one day left. If you're a chronic procrastinator like me, this happens *for every exam and paper ever.* (If you'd like to learn more about procrastination, how to fight it, and how to harness its powers, <u>this article</u> is amazing. In fact, the <u>entire blog</u> is amazing – Devin and I have read every post. Anyways, back to ultralearning...)

In order to learn all the necessary material in a short period of time, you'll need to create what's called a superday. Here's how an ultralearner might manipulate their physiology and psychology to achieve a superday (warning: this might be reminiscent of the opening scene in American Psycho):

- 8:00AM Wake up
- Chug a half liter of lemon water for wakefulness and sustained energy
- Take a <u>cold shower</u> for increased adrenaline levels, a flood of mood-boosting neurotransmitters, and instant alertness
- Eat a high-fat, medium-protein, carb-free breakfast (ex: omelette, an avocado, and Greek yogurt). Consume coconut oil, which contains medium-chain triglycerides, to help you attain the high energy state of ketosis. Ketosis occurs when your mitochondria uses ketones (fats) instead of glucose (carbs) to produce energy for your body, which is a superior form of energy.
- Brew a large pot of green tea. Green tea contains non-essential amino acids which work synergistically with caffeine to produce sustained and focused energy. Drink a cup every hour until 3PM. (be sure to <u>cycle off</u> caffeine at least every month in order to minimize tolerance)
- Plan out your study day. How would how like to attack your studying? What are your goals?
- Turn off the internet on your laptop and phone
- 9:00AM-12:00PM Study. During this four hour period, you goal should be to attain the state of "deep work" (the book <u>Deep Work</u> by Cal Newport is a great introduction to the concept)
- 12:00PM-1:00PM Do some form of exercise. A personal preference is a good game of squash, though the only requirement here is that you work up a sweat so that your brain will be running on endorphins and you'll have renewed energy for your next study session.
- 1:00PM-1:30PM Eat lunch
- 1:30PM-5:00PM Study
- 5:00PM Go do something fun. If you've successfully attained a highperformance state throughout the day, you shouldn't have to study past 5PM. So reward yourself with the night off!

This is just one example of a superday. The key here is to consciously monitor and optimize any external factor that might impact your cognitive performance. There are more than you think: (You don't need to go through this entire table, I just want to prove that there are many)

	$\rightarrow$ Cleanliness of surrounding area		$\rightarrow$ Hunger
	$\rightarrow$ Sounds	ors	$\rightarrow$ Thirst
	$\rightarrow$ Access to sunlight	act	$\rightarrow$ Sleepiness
	$\rightarrow$ Weather	al F	ightarrow Having exercised that day
	$\rightarrow$ Home vs Isolated from home	sic	→ Presence of post-exercise endorphins
ors	$\rightarrow$ Presence of non-studying people	Phy	$\rightarrow$ Caffeine
acto	$\rightarrow$ Presence of study partner(s)		$\rightarrow$ Emotional state
al F.	$\rightarrow$ Comfortableness of clothes		→ Progress leading to feeling of accomplishment
enta	$\rightarrow$ Chair	ated	$\rightarrow$ Perceived importance of task (Base Factor)
ů.	$\rightarrow$ Time of day	rel <sup>s</sup> rs	$\rightarrow$ Time until deadline (Base Factor)
viro	$\rightarrow$ Music	cto	$\rightarrow$ Whether someone is dependent on outcome
Env	ightarrow Wearing headphones (no music)	vati Fa	ightarrow Having something fun planned afterward
	$\rightarrow$ Internet-connected phone	loti	$\rightarrow$ Giving yourself mini-rewards
	ightarrow Access to internet on laptop	2	$\rightarrow$ Goal-setting
	$\rightarrow$ Room temperature	้า รั	$\rightarrow$ Difficulty of task
	ightarrow Access to snacks	the	$\rightarrow$ Use of the Pomodoro technique
	$\rightarrow$ Access to water bottle	Fa	ightarrow Degree to which you can limit multitasking

#### Figure 2.2 Factors impacting studying effectiveness

#### **Internal Factors**

Now that you've mastered your body, let's look at the actual strategies you'll need to use.

Honestly, there isn't enough room in this pdf to teach you how to all the ultralearning strategies. Devin and I had to take multiple online courses (on the subject of <u>metalearning</u>) and go through months of experimentation before really mastering the art of learning really fast.

I can give you some basics, but if you'd like to really dive into it, I found <u>this online</u> <u>course</u> to be a pretty good introduction to the subject.

Here are some basic principles to get you started:

• An overarching principle of ultralearning is that instead of compartmentalizing your knowledge, you need to create a *web* of knowledge. That is, you need to

constantly make connections between different concepts. Every time you come across a new concept, ask yourself, how does this idea related to other concepts? Additionally, how does every concept related to a real life scenario? For instance, you could compare derivatives from calculus to the speed and acceleration of a car.

- Use summarization. Have you ever taken a course where you are allowed to bring a "cheat sheet" into the exam? Chances are, you barely had to use it during the test. Take advantage of the benefits of summarization by making cheat sheets for exams even if you aren't allowed to bring it on test day.
- In class, use flow-based notetaking. This link will teach you the concept.
- Numerous studies have shown that if the subject matter involves fairly basic concepts and lots of memorization (such as a Marketing course), the most effective study tactic is *active recall*. Sounds simple, yet it's hard to do it correctly. For this reason, I created an excel tool as a helpful platform for an active recall strategy, found in the link below:

#### https://drive.google.com/open?id=0ByDj1Tyo\_QldZTRNUnBPUkVyVU0

There are plenty of other strategies you can find online to help maximize learning efficiency. However, I think the main difference between an ultralearner and a wannalearner is having an experimenter's mindset. That is, you need to be intentional about improving your learning speed. Every time you try a new tactic, you need to self-assess its effectiveness to determine whether or not to add it to your ultralearning toolkit.

Also, much of what we know has been derived by the work of Scott H Young and Cal Newport. If you're interested in further information about metalearning, I would encourage you to look into these two fascinating individuals.

## **University Courses under the Microscope**

Jumping off a cliff hurts less if you know how hard to brace yourself. That is why the *Bracing-Yourself-for-Survival* table was created. Not that university courses are actually analogous to falling off cliffs (ok besides interest theory).

The hope is that this table will allow you to:

- 1. Gain insight into how to best tackle each course
- 2. Get a better sense of how much effort and time you should put into each course, and how to best tackle them.
- 3. Devise balanced semesters. If you sign up for Models 2, Admin Poly, and Derivatives 2 all at once after reading this table, you're using it wrong.

Note that the table is geared towards Asper students. If you are a science student, however, you will find that some courses are missing from the list.

Course	Difficulty	Time	Warnings & Advice
Introduction to Microeconomic Principles	÷9¢	XX	Material is easy to grasp, exams are typically multiple choice. Study slides, textbook optional
Business and Society	\$ <b>6</b> \$ \$6\$		Attend lectures, textbook recommended. Expect to write papers.
Introduction to Calculus	\$ <b>9</b> \$ \$ <b>9</b> \$	XX	Doing practice questions and past exams is key. Textbook recommended for practice problems
Basic Statistical Analysis 1	4 <b>6</b> % 4 <b>6</b> %	XX	Doing practice questions and past exams is key. Textbook probably not necessary
Introduction to Macroeconomic Principles	4Q2	XX	Material is easier to grasp, exams are typically multiple choice. Study slides, textbook optional
Management and Organizational Theory	\$ <b>6</b> \$ \$ <b>6</b> \$		Attend lectures, textbook sometimes necessary, typically a paper to write
Introduction to Organizational Behaviour	\$ <b>8</b> \$ \$ <b>8</b> \$	XXX	Same as above. Tons of overlap between the two courses
Vector Geometry and Linear Algebra	4Q4	XX	An easier math course, lots of proofs to memorize
Calculus 2	\$\$\$; \$\$\$; \$\$\$;	XX	$\swarrow$ to success = practice exams. That is all.
Introductory Financial Accounting	\$\$\$ \$\$\$	XX	Lots of material to learn. Past exams are key. Lab attendance of questionable value
Interest Theory		XXXX	Widely considered to be the "weed out" course for students. If you don't know what "weed out" means you should probably look it up. Seriously. Not on urban dictionary though.

#### Bracing-Yourself-for-Survival Table

Multivariable Calculus	4994 4994 4994 4994 4994 4994	XX	More complicated version of Calc I.
Probability 1	\$ <b>\$</b> \$;\$\$\$;\$ <b>\$</b> \$;\$ <b>\$</b> \$;	XXX	Exams are difficult, often lots of proofs
Economic and Financial Applications	48: 48: 48;	XX	Little material but exams are difficult
Corporation Finance		XX	If you've taken interest theory, this course will likely feel like a joke
Sequences and Series		XX	Problem-solving based course, practice questions and exams are key
Introduction to Probability II	4Q	XXX	Similar to Probability I, though many find this course to be easier than its prerequisite
Actuarial Models 1	ୟରୁ ଧ୍ୟୁରୁ ଧ୍ୟୁରୁ ଧ୍ୟୁରୁ ବହିତ ବହିତ ବହିତ ବହିତ		Use an actuarial manual such as ASM. Alternatively use TIA as a substitute for attending lectures
Financial Derivatives for Actuarial Practice	39; 39; 39; 39; 39;	XXXX	Use an actuarial manual such as ASM. The exams are sometimes considered more difficult than exam MFE
Business Communications		XXX	Lots of papers, questionable grading methods, textbooks often not necessary
Introduction to Management Sciences	\$ <b>6</b> \$ \$ <b>6</b> \$	XX	Easy midterm, hard final. Conceptually not difficult to grasp
Introductory Managerial Accounting	9 <del>8,</del> 9 <b>8</b> ,	XX	Similar to financial accounting, more number-based, actuarial students often find this easier than its prerequisite
Actuarial Models 2	\$6; \$6; \$6; \$6; \$6; \$6;		Use an actuarial manual such as ASM. Alternatively use TIA as a substitute for attending lectures
Commercial Law	4Q\$ 4Q\$ 4Q\$		Lots of memorization. The online course is much easier. Do you prefer easy or hard courses?
Fundamentals of Marketing	A B A	XX	Memorization course. Lists upon lists. Online course is slightly easier
Supply Chain and Operations Management	490 490 t	XX	Study exams from textbook, expect a group project
Administrative Policy	38; 38; 38; 38; 38;	XXXX	This course draws upon all the knowledge you've gathered throughout your degree. Lots of case studies.
Human Resource Management		XX	Memorization course. Exams relatively straightforward, expect a presentation
Time Series and Regression Analysis for Management	48; 48; 48;	XXX	Programming course using R. Easier with prior coding experience
Information Systems for Management	48: 48: 48;	XXX	Lots to learn and hard exams
Ethics and the Environment	4 <b>9</b> 00 4 <b>9</b> 00	XXX	Attend lectures, lots of papers, textbook optional.

## **The Actuarial Exams**

Ever wondered why actuaries get paid so much? Because of these things.



Which actually doesn't even look that terrifying...

Preliminary Exams VEES FAP Modules Choose one... General Insurance Refreshent Bellent Refreshent Bellent

Until you realize you're probably this guy.

Or maybe you're not even on the Preliminary Exams rectangle yet. Either way, you've worked pretty hard yet you feel like you haven't even made a dent in your exam journey.



Or worse, maybe you're this guy.

Maybe you barely passed P and you're looking ahead at the increasingly large hurdles with a visible air of despair.



What you might not realize though is that every time you jump over a hurdle, *your legs get stronger*. The logical part of your brain gets more developed. You learn the common SOA tricks. Most importantly, you learn to learn. So quit worrying.

Alright enough with the sappy motivational stuff. Give me some real information you might say.

## **Real Information**

Let's look at the preliminary exams because that's all you really to know about right now. The FSA track stuff will be discussed in section three.

Exam	Difficulty of material	Time	How well the university course prepares you	Recommended Study Material
Р	5	4	Pretty Well	ACTEX + Adapt
FM	4	5	Really Well	ASM + Adapt
MFE	9	5	So-so	(ASM/ACTEX) + Adapt
MLC	8	7.5	Well	TIA
С	7	9	Well	(ASM + Adapt) <b>OR</b> TIA

Here's some pretty useful information.

Although there is some obvious subjectivity associated the *difficulty* and *time* columns, I feel confident that the study material I've recommended for the exams are the best option for 95% of you.

Alright now here's a colorful graph to help you visualize the relative scariness of the exams.



Figure 2.3 Comparing the preliminary exams

It is sometimes helpful to picture the relationships between the five preliminary exams. The following diagram illustrates how I visualize these relationships.



## How to Interpret This Diagram

- The thickness of the "streams" indicate how related the exams are (ex: C is heavily based on P)
- All the streams flow upwards

#### Figure 2.4 Relationships between preliminary exams

Conclusions from this diagram:

- MLC is more based on P (hence why the circle is more yellow), while MFE is more based on FM
- There is no relationship between P & FM, or between MFE & MLC & C. Therefore the only real requirement is that P and FM are taken before the other three. Other than that, you can play around with the order depending on your courses/preferences/timing.
- Some of the material in C seemingly comes out of nowhere

## Some General Actuarial Exam Tips

- **Don't spend too much time learning.** This may sound counterintuitive, but the reality is that 75% of your learning comes from doing practice questions. However, it is extremely important to understand that doing large amount of questions is secondary to *understanding the questions and reviewing your mistakes*. So ask yourself the "why" questions don't move on to the next problem until you're confident you understand all the mechanisms at play in the question. And perhaps most importantly, you should periodically review all mistakes you've made and understand why you made them.
- **Immediate feedback is key.** You need to be able to see the answer *immediately after you've attempted the question*. That is why I recommend doing Adapt quizzes instead of the exams. It can be beneficial to write a

couple Adapt exams to simulate the nerves you'll feel on exam day, but *Adapt quizzes should be the centrepiece of an effective study plan*.

- Don't waste your time doing Adapt exams over EL level 7. Focus your energy in the 4-6 range.
- **Use your calculator wisely.** Use the store function. Learn the STAT functions for exams MFE and C.
- A few days before the exam, **create your own cheat sheet** and try thinking about how all the formulas relate to one another. This will help you recall the formulas and gain a greater understanding of the material.
- The day before the exam, it can be highly beneficial to **use the quiz machine-gunning technique**. That is, spend a few hours doing hundreds of questions through Adapt quizzes. But instead of actually answering the questions, think about how you would attempt to answer the question *in your head*. Then, reveal the answer to see whether or not your approach was correct.
- Read the "Ultralearning" section of the Actuarial Survival Guide!

#### Exam-Specific Advice

Alright now let's dive into *exam-specific advice*. You'll notice that every section is written with a very different approach and writing style. This is because they were all kindly written by different contributors!

Note: If you're not writing any exams right now, skip over this next section.

## Exam P

#### By Devin Kinley

Most of you reading this will be taking the courses STAT 2400 and STAT 3400. These courses are pretty good at teaching you the theory you will need to know in order to pass Exam P. Unfortunately these courses will not give you the same type of questions you will see in Exam P.

I believe taking the courses then taking practice tests on ADAPT for 3-4 weeks is sufficient to pass EXAM P. I did about 20 EXAM P practice exams, this was probably overkill but I passed.

For those of you who will be taking those courses here are a couple tips specifically for that course.

• That terribly large textbook you will need to get, make sure you get the hardcover one. The paper cover one will definitely fall apart and you won't be able to resell it

- You will have to do a lot of proofs. I used to hate proofs but take this opportunity to understand the proofs rather than memorize them
- Generally, the textbook questions suck. If you are finding them too hard, go online to practice questions or use the ACTEX. I found this particularly useful when doing permutations and combinations

I'm going to split this section up based on the sections from the ADAPT Exam P cheat sheet. I highly recommend you get this.

I won't be teaching you all the material; I will just lightly touch on a number of important concepts I want to highlight.

#### General Probability

All I will say in this section is that if you can understand how Bayes' Theorem works then you are probably ready to move onto the next section. Both draw out Bayes' Theorem and prove it mathematically.

$$P(E_{i}|A) = \frac{P(A \cap E_{i})}{P(A)}$$

$$= \frac{P(E_{i})P(A|E_{i})}{P(A)} \text{ (by multiplication rule of probability)}$$

$$= \frac{P(E_{i})P(A|E_{i})}{\sum_{j=1}^{n} P(E_{j})P(A|E_{j})} \text{ (by the result of theorem of total probability)}$$

#### Univariate Probability Distributions

The survival function (S(x)) is very very important for Exam P. This is one of those functions they hardly touch on in the stats courses. It becomes especially helpful for calculating expected losses given there is a deductible and a limit.

Another function that is sometimes useful is the moment generating function. I'll be honest, I hardly used the formula but after revisiting the material I can definitely see the value in using this formula. I recommend familiarizes yourself with this formula because in certain situations where you have to calculate variance or moments of a function, this function could prove to be useful and time-saving.

#### **Distributions**

Understanding what each distribution does and how they are related to one another will absolutely save you time. Success in the actuarial career cannot be achieved by just performing the mathematics without understanding the concepts. You must always understand the concepts. I will be going through each distribution, I want

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you to try and understand why the graph looks like it does and how they came up with the formula. I think this can be relatively easily done with every formula with the exception of the Poisson distribution. Looking at the proofs for these formulas and how they were developed is massively beneficial.

So let's go through the basic distributions.

#### Poisson Distribution

You and your lovely significant other are taking an evening out to watch the stars. You being an aspiring actuary know that on average you will see 1 shooting star every hour. There are 4 hours between 10PM and 2AM and you know that the average amount of shooting stars you will see is 4 (1 shooting star every hour).

You happen to be a real keener so you model the probability of the total amount of shooting stars you will see in the night. You decide to model the event with the Poisson distribution because:

- 1. Each shooting star is independent from each other or in other words, one shooting star has no effect on whether another shooting star will happen.
- 2. The rate/average of shooting stars is known and constant (4 shooting stars per night in a four-hour viewing session)
- 3. The event is discrete. You can count in whole numbers the amount of shooting stars you see, 1,2,3... (You will never see 1.2 shooting stars).
- 4. Two shooting stars technically can't occur at the exact same instant (moment of time)
- 5. The probability of seeing a shooting star remains constant all night



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You create this fancy graph to demonstrate the probability of seeing a shooting star. The rate/mean amount of stars you will see is 4 so  $\lambda = 4$ .

You also calculate just for fun the probability of seeing a shooting star given  $\lambda = 1$  or  $\lambda = 10$  just to compare the graphs.

#### **Exponential Distribution**

Now you know the amount of shooting stars you are likely to see but you also want to know how much time you will have to wait until you see your first shooting star.



Since time is a continuous function (You can have 1.2 seconds) you need to use a continuous distribution. The exponential distribution is perfect because calculating the probability of the amount of time you will have to wait in between Poisson events derives the exponential distribution (Proof can be found online).



 $f(x,\lambda) = \lambda e^{-\lambda x}$ 

λ= mean of Poisson distribution

\*Note, mean of exponential distribution =  $1/\lambda$ 

#### Gamma Distribution

Now you want to calculate the probability of the amount of time you will have to wait for 3 shooting stars to happen. This can be done with the Gamma distribution. The Gamma Distribution simple equals the sum of "a'' exponential distributions.



#### Discrete Uniform

The discrete uniform distribution is probably the easiest distribution to learn. All it means is that each event x has the exact same probability. For example, when rolling a fair die the probability of any event occurring (1,2,3,4,5,6) is the exact same.



#### Continuous Uniform

Continuous uniform is the exact same as discrete uniform the only difference being that continuous means you can have any event between a set of two constraints. For example, pick any number between 1 and 3. The possible events are infinite but

the events are also constrained between 1 and 3.



#### <u>Binomial</u>

You decide to flip a coin 10 times. You want to calculate the probability that 5 of them are heads. To do this you use the binomial distribution. This is because:

- 1. The events are discrete
- 2. There is a set amount of times you will flip the coin (10)
- 3. Each flip is independent of the last meaning the probability of flipping a head (p = 0.5) does not change after each flip
- 4. You can only have 10 maximum successes. This is different from the Poisson distribution because in the Poisson distribution in one night you could theoretically see an infinite amount of shooting stars

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Notice the similarities of this graph and the normal distribution. In fact, if you take the limit as N approaches infinity, the binomial distribution becomes the normal distribution.

#### **Geometric**

The geometric distribution is in many ways the discrete version of the exponential distribution. In the geometric distribution, we take an event like flipping a coin and calculate the probability of how many times you will have to flip that coin until a head appears. Theoretically, you could flip that coin 1000 times and still never see a head appear.



 $p(x) = (1-p)^{x-1}p$ 

x = # of attempts

p = probability of flipping a head (0.5)

p(x) = probability of x attemptsuntil a head appears

Notice the intuitive nature of the uniform, binomial, and geometric distributions.

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#### <u>Hypergeometric</u>

Let's say you are choosing at random 5 people one at a time from a class of 50. 25 of the individuals are female. You want to know the probability that all 5 people chosen at random are female. The interesting thing about this situation is every time you choose a female, the population size of the females reduces and there for **the probability of choosing a female is not constant.** In situations like this where you have a selection over an entire population (50 people) and the population shrinks after every event you use the hypergeometric distribution. The binomial distribution is different because no matter how many times we flip the coin, the probability of getting a head remains the same (50%).



Notice that as N approaches infinity and the proportion of females remain the same (50%) the hypergeometric distribution becomes the binomial distribution.

#### The Normal Distribution

I'm actually going to leave this explanation alone because I think everyone has already taken stats 1000. What I will say is this distribution is extremely useful and if you are not familiar with it get familiar with it.

#### Multivariate Probability Distributions

In statistics, there are a lot of little tricks that can save you a lot of time. Since in the actuarial exams you are given such little time to complete each question it is very important that you learn as many of these tricks as you can. These tricks you will come across when doing practice problems so all I can recommend is to record each time-saving trick and do a lot of practice questions. You have to be able to recognize a distribution when given to you. For example, a type of question you may see is "Find the expected value of  $f(x,y) = \frac{e^{-(\frac{3x+2y}{6})}}{6}$ ". We can see though that this function is just two independent exponential distributions multiplied together. By only doing a few calculations I know  $f(x) = \frac{e^{-x/2}}{2}$  and  $f(y) = \frac{e^{-y/3}}{3}$  meaning that E(x) = 2 and E(y) = 3 so E(x,y) = E(x)\*E(y) = 6.

Had I not recognized that this was two independent exponential distributions multiplied together then it would have taken me much more time.

Some of these tricks are found on the ADAPT cheat sheet. The ADAPT cheat sheet is only 2 pages; not learning every part of it would be a mistake.

#### Insurance and Risk Management

This section boils down to really one beautiful formula that you will absolutely use.

Expected Value of Payment, Y

$$\mathsf{E}(\mathsf{Y}) = \int_{d}^{d+u} S(\mathsf{x}) \, \partial \mathsf{x}$$

- Where S(x) is the survival function (1-F(x))
- d = deductible
- u = limit

## Exam FM

By Serge Buda

Since passing Interest Theory is the hard step in the exam FM journey, these tips will mainly be interest theory related. Here are some Do's and Don't.

## **Do's of Interest Theory**

#### **General tips:**

- Now is the time to figure out what your learning style is. Find an effective studying technique that will work for you in the most time efficient manner. "Learn the best way to learn."
- Ask questions! Ask the professor to clarify fuzzy concepts or theories. Understanding the theorems and logic behind these questions is what will lead to success.
- Go into the course with a positive mentality. Do not strive for a pass go in with the mindset of wanting to excel!

#### **Study tips:**

- **READ THE ASM MANUAL!** Practice, practice, and more practice is the real key to success.
- Learn from every mistake you make. For every incorrect question, review the solution, review the theory, and redo the question time and time again.
- Study the many shortcuts and tricks in the ASM on how to solve questions easier and quicker. Stick with the ones that make most sense to you!
- Devote specific hours every day for studying. While studying, make sure you practice your timing of questions. These exams are very time constraining.
- Do end-of-chapter questions from the Financial Mathematics textbook. They are far too simple, but will assist in understanding the theory better.
  - Solutions can be found here: <u>http://www.bpptraining.com/html/FMsolutions.htm</u>

#### Exam tips:

- Ascending order of difficulty of class midterms is the following: 1 3 2. Do well on the first (easiest) midterm to help carry you through the course.
- Draw a timeline for every question. For questions you don't fully know how to solve, work on getting part marks.
- Use your time wisely. Put in time where you know you can get your marks, partial or full.

## Don'ts of Interest Theory

- Do not spend too much time on questions you can't solve on exams. Know which questions you need to avoid spending time on.
- Do not get overconfident after the first midterm. Concepts, questions, and exams increase heavily in difficulty.
- Do not underestimate the class or the work that needs to be put into it. This will absolutely be one of the most difficult courses in your university career.
- Do not skip class or let yourself fall behind schedule. Do your best to keep up with the studying as this is a fast-paced course that only gets more difficult if you fall behind.

## Exam MFE

By Devin Kinley

To begin, you will need the MFE ADAPT cheat sheet, luckily as a UMAC member you will receive a discount on ADAPT. This cheat sheet is your absolute best friend; you will use it for the first couple days in order to understand all the formulas. The next thing you will need is the ASM or the ACTEX. You will use these to do practice problems.

Below are all the sections on the MFE cheat sheet. If you understand the whole cheat sheet then you will almost certainly pass as long as you practice. The (#'s) represents my recommend order in which you learn the sections.

The key to passing MFE is to have a very strong understanding of how each section works. You must understand why the lognormal model is being used. You must understand how the Black Scholes Model is derived from the lognormal model. You must understand how each variable in the binomial model works with one another.

This cheat sheet gave me the impression that there are a hundred formulas to remember. That is not the case; there are only a handful of formulas and concepts. Most of the equations in the cheat sheet are just derived from a handful of very important formulas.

Section	Advice
Put-Call Parity (1)	This equation is extremely useful and you will use it for many questions on the exam. It is very simple, though the currency exchange equation can be quite tricky. Learn that equation after you learn Black Scholes for currency options.
Comparing Options (2)	Very simple. Look in the ASM and derive the American Option equation for an early exercise. I always just derived this equation in the exam and didn't memorize it.

Binomial Model (3)	Easy Idea but also a very large idea on the exam. I recommend you derive most equations from this section so you understand how it works.
Lognormal Model (4)	
Black Scholes (5)	Black Scholes is based off of the Lognormal Model
Exotic Options (6)	Slight Variations of the Black Scholes Equation. Once you understand the Black Scholes equation, all the other exotic option equations make a lot of sense.
Delta Hedging (7)	
Monte Carlo (8)	
Brownian Motion (9)	Geometric Brownian Motion is almost the same as Lognormal. Just make sure you understand how normal Brownian motion works and Itos Lema
Interest Rate Models (10)	

#### What I recommend

- 1. Start with the Put-Call-Parity and go in the recommended order of learning
- 2. For each section sit down with a good study friend and discuss the logic behind the fundamental equations
- 3. Attempt to derive each equation
- 4. Do a couple of practice questions from the ASM or ACTEX and really focus on understanding how and why you made a mistake on a question.
- 5. Move on to the next section and repeat
- 6. Once you understand each section attempt to link how each section relates to one another
- 7. Once you have a strong understanding of each section do an ADAPT exam. This first exam is primarily to evaluate where you need to practice. Take your time and pause the exam. Get through the entire exam, it's tempting to quit and look at the answer but for this one exam just get through it. After the exam is completed you should spend as much time as possible reviewing your answers and understanding how it all works.
- 8. Evaluate where you need work and where you don't need work. Where you are doing the most poorly review the concepts again and write ADAPT quizzes until you feel comfortable with that section.
- 9. You may find ADAPT quiz questions are beginning to repeat if this is the case do practice questions from the ASM or ACTEX.
- 10.Once you feel comfortable in each section write an exam without pausing and without quitting early. Pretend it's the real thing.
- 11.Repeat steps 8-10

## Exam MLC

#### By Cedric Gousseau

The notorious exam MLC. This merciless exam haunts you forever if you do not approach it the right way. Here are some quick tips on how to attack this exam:

- Use The Infinite Actuary and follow the exact plan recommended by the instructor. Speed up the videos by 1.5X, or 2X when the videos are particularly slow.
- The beautiful thing about this exam is that the concepts *build upon themselves really well.* This is useful as you won't have to spend much time reviewing earlier concepts as they will be integral to the later chapters. Additionally, you'll be able to easily make connections between different ideas and formulas, which will reduce the amount of memorizing you'll need to do. So every time you encounter a new concept, try to connect it to other ideas from course.
- With exam MFE, you can probably get away with passing the exam without really understanding any concepts, and rather simply doing practice questions until you understand the procedures. However, this is not the case with MLC. This exam, particularly the written answer portion, requires you to have an indepth understanding of all concepts. So don't move on to the next topic until you've fully understood the topic you're studying.
- MLC concepts are very intuitive. For this reason, it is important that you are able to reason out every formula in words instead of simply memorizing the algebra.
- I found it very helpful to create a (gigantic) cheat sheet for MLC. Write down every formula you need for the exam, and group them in a logical manner. Since most concepts are interrelated, draw lines between all formulas that relate to one another.
- Do all available practice exams. There are currently five released versions. If you need more practice, TIA created sample exams which closely mimic the real thing.

## Exam C

By Martin Marion

This exam was a long journey for me. I began studying for it in January and was able to pass it in June. In total, I spent over 400 hours studying and doing practice questions. What makes this exam difficult is the volume of material that you have to learn. There are over 60 sections in the ASM manual which at first glance may seem overwhelming. Therefore, this exam requires a good strategy and a lot more time to prepare for than the earlier prelims. As a result, I'm going to describe the strategy I used to learn the material and prepare for the exam.

#### **Review Exam P Concepts**

You can think of Exam C as a sequel to Exam P as most of the concepts learned in Exam C are built on the fundamentals learned in Exam P. Therefore, before diving into the material, I would highly recommend taking a couple of days to thoroughly review basic concepts such as conditional variance and expectation. Conditional variance is a recurring topic throughout the material, so a thorough understanding of it is crucial in order to pass the exam. In fact, it is a prerequisite to pass. After you've spent some time reviewing, you are ready to start the material.

#### Learning the Material

Everyone has their own way of preparing for SOA exams that works best for them, so I'm going to share what worked for me. Due to the sheer amount of material, I didn't feel like reading through an entire ASM manual that's over 1000 pages long, so what I did instead was purchase the video lecture bundle from Coaching Actuaries that includes ADAPT practice exams. (TIA video lectures are a great alternative as well). It did cost about 350 USD, but I think it's a great investment. I'd rather spend a little more upfront, rather than having to pay to write the exam again. The video lectures follow the same order as the ASM manual and provide a very efficient, and convenient way of going through the material. Each section includes a video explaining the concept followed by a bunch of video solutions to ASM practice questions. I would have the formula sheet and the appendix tables printed out in front of me and watch the video and then try the practice questions on my own first before watching the solutions. I would try to do at least 1 section per day which on average would take me about 2 hours to do. (Some sections are long and some are short). After finishing the material, it was time to practice.

#### Practice

I spent about 2 months doing practice exams and questions, and in hindsight that may have been overkill, but it's better to be over prepared. I began by doing the SOA sample questions. There are 307 questions and I recommend attempting each question due to the sheer amount of material and variety of the style of questions that could be asked. After I finished going through the SOA sample questions, I started on ADAPT exams. In total, I wrote 22 practice exams and achieved an EL (earned level) of 8. In my opinion, if you write at least 15 practice exams and can pass a level 6 exam, you should have a good chance of passing the actual exam. I also did attempt 2 Mahler practice exams but found them to be way too difficult and not very helpful. Finally, during the last couple days before the exam, I stopped practicing and just reviewed the formula sheet and appendix tables.

#### Calculator Tip

For Exam C, I would recommend using the TI-30XS (Multiview) calculator over any of the other approved calculators. Many of the questions will require you to calculate sample statistics (mean, variance, etc.) from a set of data which could be very time-consuming. The TI-30XS allows you to input the required data into a table and calculate what is required in one step. It works like a spreadsheet and it can save you a lot of time on the exam.

Good luck to everyone who is writing in the upcoming sitting and if you have any other questions about Exam C or if you would like a calculator tutorial, don't hesitate to contact me at (204)-990-3714 or email me at marionm4@myumanitoba.ca

## SECTION THREE

## the actuarial profession in a nutshell

by Devin Kinley

## **Introductory Comments**

The goal of this section is to equip you with a solid base of knowledge about the actuarial profession, which will hopefully allow you make more informed career decisions. This knowledge could also come in handy in interviews and info sessions.

The information in this section was gathered from conversations I have had with a number of different actuaries as well as other online sources. I would like to emphasize one particular text that I found exceptionally useful when writing this section as well as during recruiting season last year: *Achieving Your Pinnacle a Career Guide For Actuaries* by Tom Miller. You can find this book online for free (legally!). It was a great read and I highly recommend that all new actuaries give it a read.

I've also found the SOA and CAS websites contain a lot of good information as well as well written and interesting articles in the magazines they host on their websites. Keeping up to date with the current actuarial environment can certainly help you make better career decisions.

## What Is An Actuary?

In order to understand what an actuary does, let's picture a world with no protection from our everyday risks. In fact, let's imagine the worst day ever  $\otimes$ . Bear with me as this is going to be depressing, but don't worry as it has a happy ending.

You're 70. You wake up early to go to work. Your pension that you've worked your whole life for has collapsed last year because of a market downturn. Your significant other also can't work because they are disabled and unable to support the household.

You get in your car. On your way to work you crash your car, totaling it. It was your only way to get to work.

You go into surgery. The procedure costs you the remainder of your life savings. You die the next day, leaving nothing to your family. Now they can't support themselves.

That was super dark, but it's done. We got through it – now time for the happy ending. *There are services that can protect us from that terrible day.* 

- Well-designed pension plans
- Disability insurance
- Car insurance
- Health insurance
- Life insurance

These products and services would have protected you on that terrible day from all the terrible financial implications of each event.

In life we have an infinite amount of risks, attacking us from every angle. Our job as actuaries is to protect society from those risks.

"How does an actuary protect society from risks?" you ask. Great question – let me give you an example. Let's say you're a 21-year-old male with no vehicle collision history and you want to buy car insurance. What an actuary will do is take that information and feed it into a mathematical model they've created based on statistics and industry knowledge to give you a quote on how much you will need to pay in premium for your car insurance policy. This is only one example; actuaries work in a wide range of areas quantifying risks and finding creative solutions to reducing risks.

## **Comparing the Types of Actuaries**

Choosing the type of actuary you would like to become is a very long process that you should spend many hours researching. In an ideal world, you would work an internship in every industry to see what suits you best. However, this is not always realistic.

Here's a mapping of most areas you can work in as an actuary:



While it's easy to move between the different purple ovals, it can be more difficult to switch blue ovals once you're further down your career.

Generally, for each one of these areas you can either work in an insurance/reinsurance company or work for a consulting company, with the exception of pensions. Pension actuaries almost always work in consulting.

Below I will briefly summarize each sector. Don't let the brevity of the summaries deceive you – in each one of these areas, there are new and innovative ideas changing the market. Each area is experiencing massive change making them all very exciting areas to work in.

#### Property & Casualty (P&C)

P&C companies insure everything besides your life or health. Personal insurance refers mainly to home and auto insurance whereas commercial insurance refers to insurance sold to businesses.

#### Life

Life insurance companies have two main product lines, annuities, and life insurance. Annuity products are financial instruments that pay the customer a sum of money on a periodic basis. These are helpful for retirement planning purposes, as they can prevent you from outliving your assets. Life insurance is insurance that pays out a sum of money on the death of the insured person. The main purpose of life insurance is to provide financial protection to family members and loved ones.

#### Health

Health insurance covers health related expenses. This sector is much larger in the United States given that the U.S does not have public health insurance.

#### Pensions

Pension actuaries mainly focus on designing and evaluating defined benefit pension plans. Defined benefit (DB) pension plans guarantee a sum of money on a periodic basis to the pension members until death. Unlike defined contribution (DC) plans, actuaries are required to evaluate DB plans in order for them to be legal. In a DC plan, a pension member is not guaranteed an exact sum of money on a periodic basis upon retirement, and thus the risk burden lies with the pension holder.

Types of Actuaries	Designation	Percentage of Actuaries (US)	Average Salary (US) in 1000's of US\$*
Life	FSA	26.5%	110-170
Health	FSA	25.4%	109-165
Pension	FSA	26%	104-141
(P&C)	FCAS	22.1%	112-194

#### Comparing the Industries

#### \*After full accreditation and 5-7 years experience

There are many different factors in choosing your line of business; salary is one of them. That being said, salary should not be the only determinate of the type of actuary you would like to become. From this table, we can see that all actuaries make a very comfortable salary, with only slight variations between each type.

There are a couple of interesting pieces of information in this graph that I would like to highlight. For instance, P&C actuaries have to become designated through the CAS rather than the SOA. The first 4 actuarial exams (P, FM, MFE, C) are recognized between CAS and the SOA. The remaining actuarial exams are specific to becoming a CAS actuary or an SOA actuary. Therefore, you should not write exam MLC until you've decided which path you'd like to pursue.

According to the above table, in the U.S, SOA actuaries account for 77.9% of all actuaries and CAS actuaries account for the remaining 22.1%. The SOA is definitely a larger organization and that does come with the benefit of more easily switching between different industries. However, once you begin working full time, switching between industries (Life, Health, Pension, P&C) becomes increasingly difficult as time passes.

The two main downsides with choosing P&C is that you need to decide earlier on what type of actuary you would like to become and secondly, you have to write a few more actuarial exams. For these two cons, you are compensated with a higher average salary.

Life	Health	Pension	P&C
Great-West Life	CIGNA	Aon	Wawanesa
Sun Life		Mercer	MPI
Manulife / John Hancock		Willis Towers Watson	Munich RE
New York Life			
Munich RE			

Here are the companies that currently recruit at the University of Manitoba, split by industry:

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Note that the vast majority of employment opportunities at the University of Manitoba are in life insurance. However, this does not represent the actual job market and I highly recommend looking for more opportunities outside of the Career Development Centre.

#### P&C vs. Life

For many students at the University of Manitoba, the question is whether they should be a P&C actuary or a Life actuary. This I believe is primarily due to the fact that the two largest employers in Winnipeg are Great-West Life, a life insurance Company, and Wawanesa, a P&C insurance company.

The table below gives a summary of the main differences between life insurance companies and P&C insurance companies.

	P&C	Life
Insured Item	Usually a physical object, like a house or car	A human life
Payout	Unknown amount and time	Fixed amount at an unknown time
Catastrophic Events	Occur frequently, reinsurance is crucial	Less of a concern
Main Source of Profit Generation	Pricing insurance well	Pricing <i>and</i> investing well

P&C insurance policies are usually renewed on a yearly basis. This is a very important distinction from life insurance policies, most of which are contracts that last decades.

For a life insurance company, claims usually occur many years in the future. Therefore the main area of concern for a life insurance company is what to do with the premium during that time. The more successful the insurance company is at investing that money the more the money grows over time.

As an actuary in a life insurance company, investment risk becomes much more of an area of focus as compared to the P&C industry. That being said, in life insurance, it is still very important to price insurance correctly.

Conversely, for a P&C insurance company, claims will either occur or not occur within the year. Because the company has much less time to profit from the effect of compounding interest, investing becomes much less of a concern.

As an actuary in a P&C insurance company, proper statistical models are the main area of focus. That being said, any surplus cash still needs to be invested. In fact,

the most successful investor of all time bought a P&C company to be able to invest all of its surplus and make massive profits. The company I'm talking about is GEICO and the investor is Warren Buffet.

## **The Actuarial Industries**

A more broad way of classifying actuaries is by the more broad industries they are a part of.



#### Insurance

The main service insurance companies provide for society is that they buy society's financial risks. At the beginning of this section, we saw why this is such a valuable industry to have.

Since actuaries are risk professionals and insurance companies are in the business of managing risks, actuaries are at the core of insurance companies.

The premise of insurance is the idea of spreading a society's risk over many different people and regions. Insurance originated in small communities where each community member would agree to cover the loss of another community member in the event of a catastrophe.

Insurance companies took the idea of spreading risk amongst individuals to whole other level by spreading risks across multiple independent regions and by offering a whole range of different products in an attempt to both distribute and hedge their risks.

Insurance companies can have two different types of ownership structures. Mutual ownership (where policyholders are also part owners of the company), and private ownership (where the company is owned by shareholders). A mutual ownership structure has both pros and cons.

Pros:

- The incentives of the mutual insurance companies are directly aligned with the incentives of the policyholders
- Mutual insurance companies do not need to earn a large profit to satisfy their owners and therefore can provide cheaper insurance

Cons:

 Mutual insurance companies cannot raise capital as easily as private/stock owned insurance companies

#### Reinsurance

Reinsurance is insurance for insurance companies. For instance, reinsurance companies will often protect insurance companies from large catastrophic events (Hurricanes, Fires, etc.).

Reinsurance becomes especially important for a company with highly correlated risks that can all be adversely affected by a single catastrophic event. For example, in 2016 Wawanesa had a huge insured position in Fort McMurray. Massive forest fires destroyed much of the city causing billions of dollars in damage. Thankfully, Wawanesa was reinsured and was able to cap their losses.

In the case of Wawanesa, Their risks are concentrated in Canada and a handful of US states. On the other hand, a reinsurance company will have their risks distributed across the entire world so one fire in Fort McMurray is unlikely to sink the entire company.

#### Consulting

Consulting firms provide professional services to other organizations for a fee. A large portion of actuarial consultants work in pensions, specifically in maintaining and evaluating defined benefits (DB) pension plans.

There are still actuarial consultants in all other actuarial specialties too, such as life, health, and P&C.

Non-Traditional

Actuaries are expanding into new non-traditional industries. Actuaries are finding employment in investment banks, software companies, and start-ups, just to name a few.

## **Actuarial Functions in Insurance Companies**

Since most of you will likely work for an insurance company I think it is important to explain the different departments within insurance companies where actuaries are often found.

The graph below generalizes some of the main departments found in most insurance companies.



#### Pricing

Pricing is the practice of determining insurance premiums based on characteristics of an insured item or life. For instance, pricing car insurance can be based on merits or age. Some sub-departments of pricing include:

- Commercial Lines Pricing (P&C)
- Personal Lines Pricing (P&C)
- Group Benefits (Life/Health)

- Group Life (Life)
- Individual Life (Life)

#### Reserving/Valuation

Reserving actuaries determine how much money the company needs to hold to cover future potential losses.

Reserving/Valuation along with Ratemaking/Pricing are the two traditional actuarial roles. It is often recommended that actuaries get some experience in one or both of these areas.

#### Enterprise Risk Management (ERM)

Enterprise Risk Management is about quantifying major risks and opportunities that can affect an entire corporation, and creating strategies to deal with these situations.

#### Analytics

In the analytics department, actuaries analyze traditional and non-traditional data sources to decipher information used to aid in the decision-making.

The new buzzword in the actuarial field is predictive analytics. Predictive analytics is about looking at unused data sources (such as information from your Fitbit) and more sophisticated techniques to make better business decisions.

#### Asset Liability Management (ALM)

ALM deals with protecting your assets from the risk of changing interest rates or liquidity problems. When interest rates change, surplus can be dramatically affected which can negatively impact insurance companies. In an insurance company, payment patterns are very complicated and properly mitigating your interest rate risk is a necessity. Scenario testing is a helpful tool to see whether current capital levels are adequate.

### **Insurance vs Consulting**

Another major crossroad you'll likely face is deciding whether to choose the insurance or consulting route. I want to stress that your career satisfaction isn't just a function of the type of work you do – your boss, department, company, and co-workers have a massive effect on your overall career satisfaction. Luckily for us, each and every job is unique in its own way. However, there are some general differences between consulting companies and insurance companies.

In many ways, consulting is similar to owning your own business as an entrepreneur. As a consultant, you work directly with clients, and your success is directly related to whether you are able to keep and attract clients.

In general, consultants must have a particular set of attributes. They must:

- Enjoy working with people
- Have strong communication skills
- Be entrepreneurially minded

Consulting companies also have smaller offices with much flatter organizational structures, as illustrates by the following charts:



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A huge difference lies in the work life balance you'll find in these two areas.

#### Weekly Hours

The general consensus is that consultants work more hours. It is very common to have a 40-hour workweek in an insurance company, not as common for consulting. Additionally, consultants' work hours can be highly unpredictable at times.

#### Study Time

Both insurance and consulting have designated study time given per exam. However, in consulting you have to work your study hours around your client needs. In insurance, you have much more freedom to choose when you study.

#### Flexibility

Consultants may have a little more flexibility with regards to vacation, especially during the non-busy season (summer).

#### Conclusion

If you want to have a more scheduled, predictable and balanced life then consider insurance. If you want a lifestyle that's more entrepreneurial but less predictable, consider the consulting track.

## FSA Tracks – What You Need to Know

By Cedric Gousseau



#### Figure 1.6 The path to FSA

Recall this big scary graph. Now let's look at the big scary part of the big scary graph.

These descriptions reflect my general understanding of the tracks based on research and speaking with dozens of actuaries about their opinions on the different options.

It is important to note here that the track you decide to follow will not limit your career options in any way. Students sometimes believe, for instance, that those following the Investments track will have to work in investments for the rest of their career. This is far from the truth. Because of this, it is often recommended that you choose a track that interests you, so as to make studying for the exams as enjoyable as possible.

#### Individual Life and Annuities

The Life and Annuities track is the most traditional actuarial path. These exams deal with the design, pricing, and reserving of individual life and annuity products. This

path is considered one the easier tracks and is the preferred track for those working at life insurance companies. If you enjoyed exam MLC, this track might be for you.

#### Quantitative Finance and Investments

The QFI track is notoriously difficult. This track deals with investments, hedging strategies, and variable annuity products. Great for those who hate memorizing and are interested in the world of investments. If you enjoyed exam MFE, this track might be for you.

#### Corporate Finance and Enterprise Risk Management

The ERM track will allow you to gain a thorough understanding of risk evaluation and strategic decision-making areas. It is meant to be applicable across all industries, making it an appealing option for those looking to eventually work outside of the actuarial world.

#### General Insurance

The General Insurance track is the FSA equivalent of the FCAS as it prepares you for the world of Property & Casualty. Currently, the general consensus is that students interested in working in the world of P&C should favour the FCAS designation over FSA-General Insurance. This is evidenced by the fact that there is currently only one student in the world enrolled in this track. Perhaps this track will improve in coming years, but for now, stay away.

#### Group and Health

This track will prepare you for the world of group insurance. A wise move if you plan to start your career in group insurance, and if you have lots of space in your brain because you have to be ready for loads of memorization.

#### **Retirement Benefits**

Generally the track of choice for those working in pension consulting as it will prepare you for working with pensions, their design and ensuring their proper reporting. If you choose this route and work is the US, you may also want to consider pursuing the Enrolled Actuary (EA) designation.

## **CAS Exam Path**

There is only one CAS track that every CAS actuary takes to become an FCAS. Below is a graph from the CAS website on the path to becoming an FCAS.



It's as simple as that – no more decision for you if you've chosen the FCAS route!

## To be continued by you, the future actuaries...