



Learning to learn

Some practical academic skills

Professor Perreault

Cover art: Christine de Pisan in her study. Detail from *Book of the Queen*, around the year 1410–1414, (Harley MS 4431, f. 4r, British Library). Christine de Pisan was a prolific scholar and writer. She published works of fiction, poetry, biographies as well as historical and political essays, many advocating for women's equality. Here she is sitting at her desk working on her ASU online degree.

Introduction

Over the years, I have seen many students enter college without knowing how to learn. These students mean well; they work hard but don't do well in their first exam. They end up disheartened and stressed, and sometimes even feel that I betrayed a tacit agreement that we had, which is that if they do everything that is required of them — attend class, take notes, study for the exam, then they ought to get a decent grade (of course that's not how your professors see it).

At the center of the problem is not knowing how to learn. Knowing how to learn involves various skills, and the problem for many students is that these skills aren't emphasized in high school. Most likely, you just didn't need these skills then. High school is a highly structured learning environment. Being a college student is like being dropped in a big dark forest with only a compass and map. It's easy to get lost if you don't have good navigational skills.

This little guide has been written for you, and you should read it. Every student who has followed the advice included here has seen an improvement in their exam scores, and I have received dozens of emails from students thanking me for it. So, I decided to write them down because not every student comes to see me during office hours. I want you to get the most out of your classes, and with this guide and a bit of work, you will. I promise you'll understand the course material better if you apply the skills discussed in this document. Your GPA will go up. You'll learn more, and you'll learn better, and you'll feel more confident.

Knowing how to learn includes taking good notes and studying. This guide has some practical advice for you on both these things, as well as on managing your time and understanding the social environment of academia. Understanding the rules of the game of academia will help you navigate college better and have more helpful relationships with your instructors.

The world of academia

Academia is a strange world. A university is not a supercharged high school. It's organized differently. Much of what takes place on a college campus has little to no counterpart in a high school. Academia has a specific perception of itself and its unique purpose in society.

Academia also plays by a different set of social rules than high school. Most students do not know the rules of the game when they enter college, and they must figure them out on their own, on the fly. That's especially true for first-generation students.

Understanding the game starts with understanding its players. Grasping your social environment will help you navigate many situations, develop more helpful relationships with your instructors, and help you avoid unforced errors. So, let's talk about academia and its quirky, often neurotic, cast of characters. By now, you know what it's like to be an undergraduate student, but what about your professors, the postdocs, and your TAs, who are most likely graduate students? What do these people do, exactly?

1. Professors

Professors have earned academia's highest distinction: the Ph.D. (from the Latin *Philosophiae* Doctor, i.e., Doctor of Philosophy. Philosophy here doesn't mean the discipline of philosophy, but rather "knowledge" in the broad sense of the term" the original Greek meaning of philosophy is "love of wisdom").

Getting a PhD is not like getting a college degree. A college degree is obtained by completing classes. To get their Ph.D., your professor had to become an authority in their field and

produce an original piece of research that expands the boundaries of knowledge. A college degree is about acquiring knowledge. The Ph.D. is about creating new knowledge.

Students are often surprised to hear that teaching is only one part of my job. The other part of my job is to conduct research. Research is how new knowledge is produced. It's how fields, be it anthropology, chemistry, or biology, advance. As an ASU professor, my job description is a so-called "40-40-20": I am to spend 40% of my time conducting research, 40% teaching, and 20% service (service is mostly committee work, and it is dreaded). This breakdown is, of course, a long-term average for how the university expects me to allocate my time — though I don't walk around with a stopwatch calculating how many minutes I spent on teaching or research this week. My time spent teaching includes time in the classroom and preparing lectures, exams, grading, office hours, and responding to student emails. It also includes graduate student mentoring.

The time a professor is expected to devote to teaching and research varies between institutions. In small state schools and liberal arts or community colleges, teaching can occupy a larger portion of a professor's week, if not all. ASU is a research university, so research is a big part of our job. In fact, your ASU professors may think of themselves as researchers first and teachers second. I mean that they went to graduate school to become researchers. That doesn't mean that your professors don't care about teaching. Most of us do. However, their graduate program may never have trained them to be teachers. Teaching in academia is (too) often seen as incidental to research — something that one has to learn on one's own after one becomes a professor. Even if one of your professors is a bit disorganized or not the most captivating lecturer, remember this: you are being taught by the very expert of the field, the people whose job is to push the frontier of knowledge.

2. **Postdoctoral researcher**

Also known as "postdocs". They are freshly out of graduate school (i.e., they have a Ph.D.) and have been hired temporarily (one to three years is typical) to acquire new skills that will better prepare them for a professorship. They work under the supervision of a faculty mentor, but they are also professionals and receive a salary: it's a real job. For many, a post-doctoral position serves as provisional employment while they try to secure a tenure-track faculty position somewhere. I was a postdoc for two years after graduate school and enjoyed it tremendously. I was glad to receive a salary after all these years in school. I was free to devote myself entirely to my research. It also helped that it was in Santa Fe, NM, a lovely city.

3. **Teaching Assistants, Graduate students**

Your TAs (Teaching Assistants) are probably graduate students. Graduate students are pursuing either a master's or a Ph.D. degree. Graduate students work closely with a faculty mentor who serves as their thesis (master) or dissertation (Ph.D) advisor. Early in their career, graduate students take classes, most of which are seminars. Seminars are small (I once took a seminar where I was the only student) and often focus on reading essential texts in the field and discussing them. Think book club, but you have to read hundreds of pages every week and perhaps turn in a fifty-page essay at the end of the semester. After a year or two of taking seminars on various topics, graduate students transition to conducting their research. This research forms the basis of their thesis or their dissertation. A Ph.D dissertation is typically several hundred pages long. In it, the graduate students present the results of their research activity. This research needs to be original and a novel contribution to the

field. When completed, the dissertation is presented in a public setting in front of a committee comprising 3-5 faculty that will grill the students and then decide whether to grant the student a PhD. Needless to say, it's a stressful time for graduate students.

These are some of the main characters you will meet on campus (others include department staff, including the all-important academic advisors, Deans, Provosts, and the President. And while academia likes to think of itself as an egalitarian institution, it isn't. Academia is very much a hierarchical world, albeit implicitly so. In the social hierarchy of academia, Faculty sit above postdocs, followed by graduate students, and, at the very bottom, you, dear undergraduate students.

What can be confusing for students is that faculty members like to maintain a level of informality with their students: Faculty members want their students to feel comfortable asking questions and reaching out to them. But there is a fine line between informality and a lack of respect. Your professors, however informal they may appear in the classroom, expect you to remain professional and courteous when interacting with them. **Unless they tell you otherwise, call them "Doctor" or "Professor" so-and-so (hint: how they sign their emails to you is a good cue of how they want you to address them.)**

How to email your professor

Emails are where I often see a lack of decorum and where students are most likely to commit *faux pas* and hurt themselves. University emails are not texts but a professional form of communication; you need to keep them professional. **When you email your professor, use this template:**

From: student@asu.edu
To: professor@asu.edu
Subject: Missing upcoming class

Dear Professor,

I hope you are doing well. I am contacting you to let you know that I will miss next Tuesday's class due to a medical appointment that cannot be rescheduled easily. I will review your lecture slides for that class, and I will get a copy of someone's notes.

Sincerely,

Your name

Some general advice on emails:

- Don't include your student ID number. We don't need them. You're not an inmate.
- **Be concise.** Get straight to the point. In your first sentence (as in the template above). It isn't rude; it's a courtesy. Your professor will appreciate it, as they get many emails daily and want to clear their mailbox as efficiently as possible. Sometimes, I receive a long, rambling email from a student, and even after reading it twice, I have no idea what the student wants.
- Always **use your @asu.edu email address.** Remember, this is a professional form of communication.

Emails are also where I learn who the mature students are. Mature students are the ones who take responsibility for their situation or their performance. When a mature student doesn't do well in a test, they will write something like, "I thought I was prepared for the test but didn't do as well as I expected. What can I do to be better prepared for the next time?". Immature students blame others "*The questions had nothing to do with the lectures*" (always a dubious claim, by the way) or "*my roommate's third-degree cousin was sick*". Which type of student do you think is most likely to get a receptive ear from their professors?

Use a calendar

You need a calendar. Full stop. Now. Whether it's a good old paper calendar or the one that lives on your phone, you need one, and now. At the end of your first week of class, make yourself a cup of coffee or tea, gather your syllabi, and **mark the important dates in your calendars**: due dates, the tests, the exams, and the review sessions. Set up alerts and reminders for the most important ones. You will be too busy to remember all those dates in a few weeks.

Your professor may remind you of important dates as they come, but don't expect it. You're not in high school anymore. The way your professor sees it, **it falls on you to ensure you meet all their deadlines**. So, make it a habit to glance at your calendar at the beginning of each week.

Taking good notes

I'll be honest: chances are, your course notes are terrible. It's not your fault: most of us were never taught to take notes before college. That's a shame because good note-taking is the most fundamental skill in the college student's toolbox — it is the student's lightsaber. Can you be a Jedi without a lightsaber? Sure. But why would you want that?

When a student does poorly on a test and comes to see me, I first ask them to open their notebook. And I usually see notes that are either too sparse or too dense to be helpful. I see jumbled words and sentences with no visual structure. I see that the critical points of every lecture are buried in a sea of unimportant material when it's not missing entirely. These notes are not conducive to acquiring new knowledge. And they make for abysmal test preparation material.

The problem is that note-taking is taken for granted: just sit down, grab a notebook and a pen, and write down what the professor says. Easy, right? Sure, but also wrong.

When you think note-taking is easy, you think your notebook is a mere recording tool. Notes do serve as external memory: by the time finals week comes around, you may not remember what you learned in Week 1. But course notes need to be much more than that. They also have to (1) distill information and (2) unravel the hierarchical structure of this information. And when you ignore these two purposes and only think of notes as recording devices, you become the worst possible kind of note-taker: a passive recording device that writes things down without much thought or understanding.

Taking good notes is hard. It isn't intuitive. It requires thinking and attentiveness. **It's an active process.** Far from something that should be taken for granted, **it is a skill you must learn and hone over time.**

Good notes distill information

To distill something is to extract its essence. In the case of lecture notes, this means **knowing what to include and what to not include.**

A lecture's **key ideas often come with illustrative details**. The illustrative details may be historical context to a lesson, an analogy, or a series of examples. The key ideas are what your professor wants to impart to you. You can also bet that the exams will focus on those main points. You must **train yourself to tease the main ideas from the details and emphasize the former in your notes**. For instance, a lecture on the role of mutations in natural selection may start with some historical context (such as Gregor Mendel's garden experiments crossbreeding pea plants) or some examples (the peppered moth in England, and bacterial antibiotic resistance). A student who passively takes notes will quickly lose sight of the plot and may leave the lecture hall thinking he just heard a lecture about peas and moths. However, the active note-taker will know better, and her notes will reflect the key point (mutation is a random process that fuels evolutionary change) from the secondary ones (Mendel's experiments, examples that illustrate how mutation works).

Distilling information means that knowing what to write down is just as important as **knowing what not to write**. Know what to keep in your notes and what to leave on the cutting floor. Write something down because you have assessed that it is an important point. Don't write something down because everyone else is in the lecture hall. You're not a lemming. Put on your thinking cap.

During my first year in college, I had to take a required Cultural Anthropology theory class. The class was challenging and steep in abstract French, British, and American philosophy, sociology, and anthropology. Students dreaded the class, and with good reason, the average grade was a C; many failed it and had to take it twice. The lemming effect was in full force, and students, at the mere sound of pen on paper, would rush to write down whatever the professor happened to be saying at that moment. I did my best to resist the pressure of the herd but couldn't help wondering if I was missing something. Whereas my friends would fill up a dozen pages of notes per class, I would have five or six. Their notes may have been remarkable in how detailed and extensive they were, but they were useless because they didn't distill the information. My notes did that, and I ended with one of the few A+s in the class. So be discerning. Think, understand, and trust yourself.

Good notes reflect the structure of the information

Your notes should be structured to reflect the structure of the material covered in class. When I open a scholarly book, I first study the table of contents because it quickly provides me with the structure of the book's content. I know what to expect, and that helps me assimilate the book's content. The same goes for your notes. **Structured notes will help you learn and understand course material.** They will make studying a breeze.

Usually, this structure will be hierarchical, with main points, subpoints, sub-subpoints, etc. In some classes, this tree-like structure will be obvious. In other courses, it may be more subtle and require you to be alert and connect the dots for yourself. Whatever that structure is, **your notes need to reflect it visually**.

Taking notes, in practice

What should your notes look like? That's up to you, and you should experiment until you find what works for you. But here are some general guiding principles to adhere to.

1. Let's get one thing out of the way: your professor's **lecture slides are not a substitute for notes**. First, slides may be incomplete. I know that my slides tend to have few words on them. And merely printing slideshows makes you an uber-passive note-taker. Actively taking notes keeps you active (i.e., awake). It forces you to pay attention. Lecture slides are helpful only if you missed a class or are unclear about some material.

2. **Use one notebook per course.** Every now and then I come across a student alternating notes from multiple classes in a single notebook, and a little bit of my soul dies.
3. **Handwritten notes are better than typed ones.** Plenty of research shows that handwriting engages our brains differently than typing notes on a laptop, and in a way that leads to better information retention and learning. Writing by hand also reduces word-for-word transcribing; it keeps you engaged and awake. And it avoids distractions from the internet. When you write by hand, **use block letters** if you can. They are easier to read and skim than cursive.
4. Don't be stingy: **use plenty of white space to separate sections and topics.**
 - Every lecture starts on a new sheet. Mark the date, week number and name or topic of the lecture on top. This will help you during exam preparation.
 - Start every high-level topic on a new page
 - Use headers, sub-headers, caps, bullet points, etc., to **mark the hierarchical organization of the material.**
 - The use of **indentation is essential.** Indentation refers to how you visually position the entries in your notes so that they are visually nested to reflect their importance. The farther to the right an item is, the lower level it is in the hierarchy.
5. **The Cornell Method is your friend.** The method is simple: you divide the pages of your notebook into sections. The original Cornell method calls for three sections, but I find that two sections often make more sense. First, draw a vertical line across the entire page, about one-fourth to one-third of the page from the left. You now have two columns. The right column (the largest one) is where you will write down your main notes. The left column (the narrowest) is the cue section. In it, you write down cues that pertain to the main notes (e.g., "Keyword," "Definition of x," or the main idea of a section of the lecture. The cue section will be handy when it comes time to prepare for a test. It also forces you to think about the material and its structure. On the next page is an example of note using this method.
6. **After class, complete and beautify your notes.** Ideally, you should have two sets of notes. The first set of notes is the one you bring to class. It's a messy one. It can be challenging to keep a good set of notes during class when things go fast, and you don't yet know the structure of the information. You may realize too late that the professor had started a new topic and that you needed to start on a new page. And handwriting gets messy when you write fast.

The second set of notes is the one you create after class is over. This one is clean, clear, and well-organized. It is legible. It uses white space—and bullet points. If you are using the Cornell method (and you should), this is where you fill out the cue column. This is also your chance to prune information you now realize was superfluous and expand on explanations or examples when your first set of notes fell short. This should all be done the same day while the material is fresh and remembered.

Cue column	Main notes
Def. Domestication	Domestication = The process whereby plants and animals change physically and genetically because of human action
3 types of transition from foraging to farming	<p>1. In some areas, farming arose independently.</p> <p>5 key regions:</p> <ul style="list-style-type: none"> a. Near East b. China c. Central Mexico d. Andes (South America, Peru) e. Eastern USA (e.g. sunflower) <p>2. Other places, transition depended on crops and animals domesticated elsewhere (i.e. plants and animals moved)</p> <ul style="list-style-type: none"> a. Indus valley b. Egypt <p>3. Other places, arrival of foreign people + crops and animals (i.e. migration, conquest, colonization)</p> <ul style="list-style-type: none"> a. Europe b. Europeans in California, Australia c. African Bantu expansion in subequatorial Africa

Figure 1: Example of notes using the Cornell Method. On the right side, your main notes. On the left side, the cues or prompt pertaining to the notes.

Finally, here are some general tips for note-taking during class time:

- **Don't write full sentences.** Certainly don't write by the lecturer is saying verbatim. That's a sure sign that you are not an active note-taker
- To write faster, **use abbreviations.** For example, btw = between, arch = archaeology / archaeological, yr = year, rc = radiocarbon, ex. = example, Def = definition.
- In the margin of your note, write down any questions you may have. You can get answers after class or during office hours if you don't get a chance to ask during class.

- Pay attention to cues of importance. For instance, when a professor keeps making the same point, it's probably one of the core lessons of the lecture.
- Pay attention to cues of information structure. Your instructor will use many different cues to mark the structure, such as *First, Second, Third*, adverbs like *Thus*, or sentences like *As a result [...]*. Be alert to them and write them down.
- *Definitions*. Always write these carefully. Always be ready to define important terms in an exam.
- *Instructions*. These are procedures with a list of steps. For example, how to calculate changes in gene allele frequencies after one generation of natural selection). Write these instructions carefully. With procedures, more information is better than too little, so don't try to distillate those steps too much.

How to study for a test

Now you have a better idea of what makes good notes good. But do you know how to use them? Think about how you study for an exam. Do you read through your notes several times until you are familiar with them? If so, then you do not know how to study. Going over your notes passively, no matter how often you do it, is a terrible to study. Just like note-taking, studying is a skill that needs to be learned. And you might have never been taught it before, not fault of yours.

But what's the problem with simply going over your notes, you may be asking yourself. The problem is that it gives you the **illusion of fluency**. After going over your notes a few times, you begin to recognize the material, and you fool yourself into thinking that this recognition means you have learned it. This is the illusion of fluency. It gives you the false perception that you have mastered the material merely because it starts to feel familiar. And yet you will repeatedly draw a blank during the test.

It's because of it that you repeatedly draw a blank when it comes to the test, even after spending hours studying.

To study properly, you have to disrupt the illusion of fluency. You do this by using a **forced recall**. When you take an exam, you must retrieve information from your brain. So, whatever study technique you settle on should reflect this.

Force recall means testing yourself; psychological research shows it is one of the most effective studying techniques.

Flashcard is by far the best elicit forced recall. Take a section of your note. If you used the Cornell method, your job is easy: use one flashcard per item in the cue column. Take the cue and transform it into a question. For example, the cue "Def. of domestication" may become "What is domestication?" Write the question at the top of the card and the answer at the bottom of the back. To study, grab your stack of flashcards, read the questions, try to answer them, and then check your answer. If you got it, move on to the next card. If you didn't, repeat until you get it.

ASB 222	EXAM 2
Question: What is domestication?	
Answer: The process whereby plants and animals change physically and genetically because of human action.	

ASB 222	EXAM 2
Question: What are the three types of transition from foraging to farming?	
Answer: (1) Farming can arise independently	
(2) Transition based on adoption of crops and animals domesticated elsewhere (the plants and animals move, not the people)	
(3) Transition based on the arrival of foreign people who bring their crops and animals (e.g. migration, conquest, colonization)	

ASB 222	EXAM 2
Question: What are the five key regions for the independent emergence of farming?	
Answer: (1) Near East	
(2) China	
(3) Central Mexico	
(4) Andes (South America, Peru)	
(5) Eastern USA	

Figure 2: Examples of flashcards

Equipped with flashcards, you will be surprised how quickly you can assimilate a large amount of information. As you study them, you will find that some cards are easy for you and others are hard. When that happens, leave the easy card on a separate pile and spend more time on the hard questions. Return to the easy pile occasionally, just to make sure that you still master them.

When you feel you have a good handle on your flashcards, shuffle them. You should be able to answer all your flashcards in any order.

In a pinch, instead of flashcards, **you can use the cue column in your notes for force recall.** Cover the main note section with a sheet of paper, and use the cue as a prompt for you to answer.

Here are some other tips on studying correctly.

- **Find a quiet environment.** No one can study well with music or a TV show playing in the background. If you think you're different, you're not. Use earplugs or stream white noise through your headphones if you cannot find a quiet place. Silence your phone for an hour, you will survive.
- Don't cram. **Multiple short sessions of an hour or less are more efficient** and less painful than staying up all night the day before a test. You'll be less fatigued, physically and mentally.
- Mnemonics can help you memorize a long list of information. For instance, if you have to remember the different ranks of biological taxonomy, you only need to remember "Dear King Philip Came Over For Good Soup." Each word corresponds to a taxonomic rank: Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species. AI software like ChatGPT will help you create mnemonics for just about everything.
- Remember that time management is key to studying for an exam. Making flashcards takes time. One week before your exam, go through your notes. This will give you an idea of the material you need to learn. It also gives you time to go to office hours if you are unclear about something. The next day, make flashcards—budget 2-3 hours for this. Then, every day until the day of the exam, test yourself.

During the exam

Here are tips for taking an objective test. Objective tests have definitive answers, including multiple choice, true/false, matching, short answer, and fill-in-the-blank questions.

- Read each question carefully. It's frustrating to get a question wrong because you didn't read it correctly.
- If you can, scan the exam first. It will help you budget your time.
- **Answer the easy questions first.** If you are stuck on a question, move on to the next one. Then, come back to the difficult questions. This will also help you budget your time.
- If you have extra time left, go over the questions again. Make sure you read the questions correctly and didn't enter the wrong answer by mistake.

What curving grades means

Contrary to what many students think, curving does not mean that free magical points are sprinkled over everybody's scores. Not so.

Imagine a 100-meter race in which everybody who runs in 10 seconds or less gets a gold medal. That's the opposite of how uncurved grading works. Curved grades are more akin to an Olympic event. It doesn't matter how fast exactly one ran – what matters is the rank order of the athlete: did you run the fastest time? You get a gold medal. Second fastest? Silver medal. **When grades are curved, your performance relative to that of the other students in the class is what matters, not the absolute score.** This means that with a curved grading scheme, a low % exam score of, say, 55 could result in an A+ if this is the best score in the classroom.

From the point of view of an instructor, an exam is an instrument. Like any laboratory instrument, it is designed to measure something, in this case, your mastery of the course material and the best students in the class. And all instruments need some level of calibration. A scale may be slightly off and add 3 pounds to each measurement. An exam may be slightly off when measuring students' understanding of the material. Perhaps some of the questions were unclear. Or much more challenging than the professor meant it to be. That's not fair to the students. When this happens, the entire class does poorly. Or perhaps it was the opposite: the exam may have been too easy. That's also not fair to the students who attended class and studied hard — students who put little effort into the class also have high scores. But more importantly, it means that the exam, as an instrument, is not accurate. Curving tries to solve this.

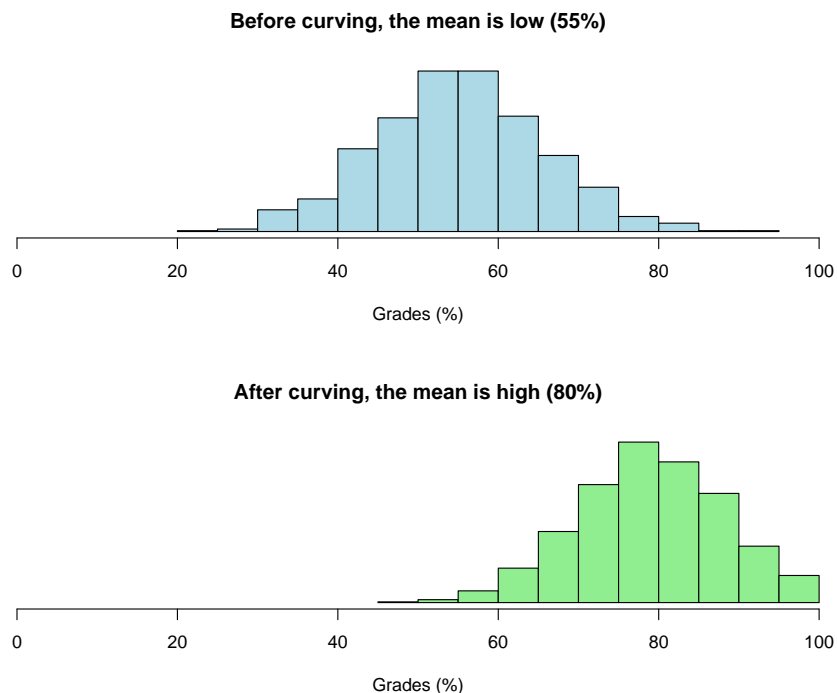


Figure 3: Curving is used to calibrate a test. Top: the original, uncurved scores in the class. This type of chart is called a histogram, and the height of the bars indicates the number of students in the class that received a particular score. In this case, the test was difficult, and the mean in the class was 55%. Bottom: The scores after curving. Curving shifted the distribution of grades to the right side. Now, the mean is 80%. In theory, curving could do the opposite: move the distribution of grades to the right in the case of a test that was too easy.

So now you understand curving *conceptually*. But how is it done in practice? There are many ways to do so, so read your syllabus carefully. A few common ways curving is done include:

- An instructor may add the same number of points for everybody. This is clumsy and only makes sense if the instructor knows their exam will be difficult. It isn't favorable to students with perfect or near-perfect scores.
- Similarly, an instructor may shift the letter grading scale. For example, instead of an *A* requiring a score between 90% and 95%, it now requires 70-75%.
- Use a percentile rank. This is the most standard way to curve grades. Remember percentiles from high school? If you run a race and finish in the 90th percentile, you ran faster than 90% of the participants. In the classroom, a 97th percentile rank score means the score that places you in the top 97th percent of the class (what that score is, in absolute number, is unimportant). Percentiles are helpful because they tell you where you stand in the class. Thus, in a class, A+ may correspond to the 97th percentile score, A to the 90-96th percentile, etc.

In the end, curving changes the nature of the game. In an uncurved class, you earn a high grade by getting high scores; in a class with curving, you earn a high grade when you do well relative to the other students.

Did you find this document useful? Do you have suggestions to make for the next version?
I want to know : cperreault@asu.edu