In this next module, I'm going to teach you how to cut clutter from your writing.

I'm going to start with one of my favorite quotes from William Zinzer's classic writing book on writing. Well, this is a great book to read for this course, if you have time. He says, the secret of good writing is to strip every sentence to its cleanest components. Every word that serves no function, every long word that could be a short word, every adverb that carries the same meaning that's already in the verb, every passive construction that leaves the reader unsure of who is doing what. These are the thousand and one adulterine that weaken the strength of a sentence. And they usually occur in proportion to the education and rank. And I find this last part especially amusing, since I do teach many people who are highly educated and high in rank. Today, we're going to practice stripping sentences of all this kind of clutter.

I'm going to jump right in here with an example sentence that needs to be stripped of clutter. It reads, This paper provides a review of the basic tenets of cancer biology study design using as examples, studies that illustrate the methodologic challenges or that demonstrate successful solutions to the difficulties inherent in biological research. You can hear what I'm reading that sentence out loud, that there are a lot of extra unnecessary words in there. I'm going to go through this word by word now and show you just how much we can cut. First this paper provides a review of This is an instance where we've taken a nice, spunky verb to review and turned it into a boring noun, a review, and then paired it with a boring verb provides. So we can just change this back to the verb by saying, this paper reviews. Then we get to of the basic tenets of, well, this is one of those vague, amorphous phrases that doesn't add anything for the reader. It doesn't help the reader understand what is going on here, so we can just cut it. so we get this paper reviews cancer biology, study design, using as examples, studies that illustrate. When I read that out loud, you can hear how awkward it is, and you can hear the repetition. The word examples means the same thing as studies. We don't need both. So I'm just going to get rid of studies and say, using examples that illustrate, then we get to methodologic logic challenges. Well, that word, method logic is again, one of those vague, amorphous words that's so broad that it adds nothing for the reader. We've already said that we're talking about study design, so methodology is implied. Then we get to using examples that illustrate the challenges, or that demonstrate successful solutions. And notice we have a repetition here. We have illustrate, which means the same thing as demonstrate. And I always picture that the author was sitting there and thinking, well, I already used the word illustrate. I don't want to repeat myself, so I'm going to go to the Thesaurus and find a second word that means the same thing. And they found demonstrate, OK, if you catch yourself reaching for the thesaurus to avoid repeating a word, always ask yourself, do I even need the second instance of that word at all? Oftentimes you simply don't need the second instance of the word. In this case, the illustrate can carry over to both the challenges and solutions. We can just say, using examples that illustrate both challenges and solutions, I'm also going to strike out the word successful here. Did you notice that? Think about it. Is there such a thing as an unsuccessful solution? There isn't. Right? The adjective successful is already inherent in the word solution. So we don't need to say successful solutions because solution implies successful. Let me get to this last part, to the difficulties inherent in biological research. We have another repetition here. We already said challenges, and now we're saying difficulties again. I'm picturing that author that has gone to the thesaurus to avoid repeating the word challenges, and they find difficulties. But just like before, we don't need that repetition at all. We also have this inherent in biological research. I don't think that adds anything, because we already know that we're talking about biology study design. Biological research, is therefore just a repetition. So, I'm going to take out this entire last bit, so we, get this paper reviews cancer, biology, study design, using examples that illustrate specific challenges and solutions. Notice how we stripped that sentence of all the garbage to get it down just to the important words, just to the words that get the idea across.

All right, here's a second example. As it is well known, increased athletic activity has been related to a profile of lower cardiovascular risk, lower blood pressure levels, and improved muscular and cardio respiratory performance. You can see again that this sentence has a lot of extra words. It starts with, as it is well known, this is an introductory phrase that you simply don't need. It's just the authors clearing their throat at the beginning of the sentence. We can strike that altogether. If you want to indicate that something is well known, just indicate that by putting citations, by putting references at the end of the sentence, then we get increased athletic activity has been related to this is just diaristic, but I kind of prefer is associated with, I like that better. And then we get to a profile of lower cardiovascular risk. Well, a profile of, again, is one of those vague phrases that just doesn't add anything. We don't lose anything by crossing that out and just saying lower cardiovascular risk. Then we get to lower blood pressure levels. Well, again, that word levels is not necessary. We can just say lower blood pressure, and finally we get to improved muscular and cardio respiratory performance. Well, that's just a fancy way of saying fitness, so I'm just going to cross all of that out and just say what I mean, which is fitness. So we get increased athletic activity is associated with lower cardiovascular risk, lower blood pressure, and improved fitness. Notice how much clutter we've stripped away from that sentence. in this example, though. I think we could even be more direct. I think we have adequate scientific evidence to state that increased athletic activity lowers cardiovascular risk and blood pressure and improves fitness. Of course, this requires a higher level of evidence, but I do think we can confidently say that exercise does have these direct effects.

Here's one last example. The experimental demonstration is the first of its kind, and is a proof of principle for the concept of laser driven particle acceleration in a structure loaded vacuum. We'll jump right into this one. I think instead of the experimental demonstration, we can just say, uh, the experiment. Then we get to is the first of its kind. And is a proof of principle. Notice that we get two to be verbs. Is it is, those are boring verbs, and maybe we can try to put a better verb in there. We also get the first of its kind, and proof of Principle. I think those are repetitive. It's kind of the same thing. So I'm going to change this to the experiment provides the first proof of principle. Just condense that the first proof of principle, then we get to for the concept of laser driven particle acceleration. I don't think we need the for the concept of that's just extra words. So that's just a proof of principle of laser driven particle acceleration. So we can get this one down to the experiment provides the first proof of principle of laser driven particle acceleration in a structure loaded vacuum. And I just want to acknowledge and thank Debrabiaska of the University of Colorado, boulder, who shared some writing examples in physics with me that appear in my slides.

All right, I want you to get in the habit of cutting unnecessary words. You have to be vigilant and ruthless. Cutting your words is really hard, because you've invested all this effort to put your words on the page. You've wrestled with the sentence. It feels like you're negating that effort by going back and throwing those words away. Also, you may have read the sentence over in your head so many times that it starts to sound good. It starts to sound like this is just the way it should be. Well, you're going to have to fight against this inertia, in this complacency. You're going to have to actively train yourself to go back and take out all those unnecessary words. Try taking out all the extra words. Read the sentence and see how it's better. See how it conveys the same idea with more power. What I always tell students is that you have the UNDO key as a crutch. You have the control Z, or the equivalent on a Mac, so you can take those words out, read the sentence without them. If you don't like the new version, you can always control Z back in. I can't tell you how many times I've done this myself. I said, well, I really like that word very in there. I don't want to take it out. But I convinced myself to try the sentence without it, knowing that I could always controls either word back in. And I've never put the word back in. It's always better without it.

Here's another example. This is a perfectly good sentence. It reads brain injury incidents, shows two peak periods in almost all reports, rates are the highest in young people and the elderly. That's fine. But compare that too, brain injury incidents peaks in the young and the elderly. See how much crisper, how much more power that second sentence has when we get rid of all the unnecessary words.

Here are some common sources of cutter that you should be on the lookout for. first of all, dead weight words and phrases, as it is well known, as it has been shown, it can be regarded that ,it should be emphasized that. These are just the authors clearing their throats. They can be deleted altogether. Just provide citations to show that it's well known. Also look out for empty words and phrases. These kinds of words don't add anything because they are too vague and empty. And I love this quote from William Zinzer. He says, some words and phrases are blobs, and that's really true. Some words and phrases are so amorphous they don't add anything. Also, look out for long words or phrases that could be short. Remember, muscular and cardio respiratory performance. That's just a fancy way to say fitness. You might as well use the short version. Look out for unnecessary jargon and acronyms muscular and cardiorespiratory performance. Again, glioma genesis. We saw that in an earlier module mir the use of acronyms. We want to avoid acronyms unless they're completely standard and well known throughout science. We also want to get rid of any extra repetition. We saw some examples of this earlier. We saw studies, examples illustrate and demonstrate challenges and difficulties, successful solutions. Um, that's an example where the adjective repeats what's already in the noun. So watch out for that kind of repetition. Finally, watch out for Adverbs. Everybody loves to put in Adverbs when they're talking in emails or on a first draft. You'll notice that I love Adverbs in speaking, but in your writing, I'm going to ask you to go back and take those out, because they're almost never useful. They're just extra weight in your sentence. You are not making your idea or statement more powerful by adding that adverb. In fact, you're losing power. So I want you to cut all those adverbs very, really, quite basically, generally, and so on.

Here are a few more examples of long words and phrases that could be short. I have tons of these examples, and will do some more for homework. A majority of that could just be most .A number of that's just many are of the same opinion. I love that one. That's just agree less frequently occurring. Just say rare all three of the Just say the three. You don't need the all. Give rise to. That's cause, due to the fact that that's just because have an effect on that's effect, you get the idea. These words and phrases don't carry the main idea of the sentence, so they're just slowing your reader down when you choose a long version when a short of short……short version would have done the same job.

Here's an example that has a long phrase that could be short. The expected prevalence of mental retardation, based on the assumption that intelligence is normally distributed, is about 2.5 %. Well, another way to say, based on the assumption of is just to say, if, if intelligence is normally distributed.

Here's an example of repetition. This sentence has a repetition in it. A robust cell mediated immune response is necessary, and deficiency in this response predisposes an individual toward active TB Notice how the two parts of the sentence actually say the same thing. One part says it's necessary. The other part says that bad things will happen if, you don't have it. So we can convey the same idea here by just saying, deficiency in T cell mediated immune response predisposes an individual to active TB. We don't need the first part of that sentence.

Here's a quote to end on cutting clutter. This is a great quote. Pascal says, I have only, made this letter rather long because I have not had time to make it shorter. My French is a little rusty, so I won't try to pronounce it in the French. But there's something to this, right? You've spent all this time writing this long sentence or paragraph or paper. But the last step of that, the final, most important step, is that you go back and make it shorter. You need to refine it, take out all the extra garbage, and get down to the essence of what you're trying to say. That's where the elegance in your writing comes in. Now, most of you probably had courses in high school or college where you were told that you had to fill some minimum number of pages, maybe a ten-page report. And at that age, you probably did not have anywhere near ten pages of ideas, so you started to learn to pad your writing with a lot of extra words, you picked up this bad habit. Now I want you to break yourself of that habit and learn to strip your writing of everything that isn't necessary. Get it down to the key ideas. When you convey your ideas with the fewest words possible, your writing is more readable, engaging and powerful.

And a former student in this course, john Hodges, was kind enough to find the original reference to this quote and shared it with me. So I want to share the original text with you here.

接下来这个单元，我会指导你们如何删除写作中冗余的部分。首先，我想以一句我最喜欢的引文开场。它来自威廉·津瑟的著作《写作法宝》。假如你时间充裕，这本书对你学习本课程将有很大帮助。他说他说良好写作的秘诀就是把每个句子剥到最精简的程度。每一个没有实际作用的词，每一个可被简化的词，每一个赘述动词所含意义的副词，每一个弄得读者疑惑“谁在做什么”的被动结构……这些就是削弱句子力量的“一千零一个”累赘。受教育的程度越高越有地位的人越容易犯这些毛病自从我开始教那些受过良好教育或有地位的人后我发现最后一句话特别有意思而今天，我们将要尝试去去除句子中所有的冗余我现在就给你们举一个需要去除冗余的例句它是这样写的:“这篇文章提供了一个癌症生物设计方法的基本原则，作为一个研究例子去说明方法学上的挑战或显示成功的解决生物研究上的解决方案当我大声读这句话时你可以感觉到这里面有许多多余的，不必要的单词在里面我将一个词一个词的分析并向你展示我们可以删去多少“首先，这篇文章提供了一个总结”这个句子把一个非常有活力的动词“去总结”变成了一个无聊的动词，一个总结而且还一起用了一个无聊的动词“提供”所以我们可以把动词换回来说：这篇文章总结了然后我们看“关于……基本的原则”这是其中一个表意不明的短语它并没有给读者什么有用的信息它并不能帮助读者理解句子的意思，所以我们删掉它然后句子变成这样

这篇文章总结了癌症生物设计方法以示例研究为例进行说明当我大声读出来时你可以听出它是多么笨拙和重复两个单词同一个意思我们不需要两个所以我们把“studies”删去，这么说：举例说明了然后我们再看方法学的挑战方法学这个词又是一个表意不明的单词它太空泛并没有什么有用的信息我们已经说过。我们讨论的是方法设计，所以方法学不用再说了注意到这里还有一个重复我们已经有和“展现”是同一个意思的“阐明”了我总是想象作者坐在那思考：我已经用了单词“阐明”我不想重复用它所以我要在词典中找到意义相同的第二个单词于是他们找到了“展现”好吧，与其让自己翻词典避免用同一个单词为什么不问问自己，我真的需要再重复这个单词一遍吗大部分情况下，你并不需要重复它在这个例子中，“阐明”可以同时指示挑战和解决方案我们可以就这么说举例阐明挑战和解决方案我同样想把“有效的“删去思考一下，有什么解决方案是不有效的吗解决方案没有吧？解决方案已经暗含了形容词有效的意思所以我们不需要说有效的解决方案因为解决方案暗含了成功的我们再看最后一句生物研究中暗含的困难这里有另一个重复我们已经说了挑战，而现在我们又说困难所以我又想象作者去翻词典避免重复用单词”挑战“，于是他们找到了困难，不过就像之前所说的一样我们根本不需要重复它这里”生物研究中暗含的“我并不认为多说了什么因为我们已经知道我们在谈论生物设计方法这里的”生物研究“也是个废话所以我直接删了整句话然后句子变成这样

这篇文章总结了癌症生物设计方法举例阐明具体的挑战和解决方案看到了吗，我们把所有的废话都删去了只留关键的单词，只留那些能帮助理解意思的好了，这里有第二个例子众所周之，运动员运动能力的增加与降低心血管疾病风险，低血压水平，和增强肌肉和心肺功能有关这里又有许多多余的单词这句话以”众所周之开始“这是一个并不需要的介绍性短语仅仅是作者在这句话开始前清清嗓子我们可以直接删去如果你想强调什么是众所周之的，可以在句子后面加上引用或参考于是句子成这样了”运动员运动能力的增强和……相关“这仅仅是有些格式化，但我更倾向于用"is associated with“我更喜欢这个(短语)于是句子成这样。大致的形象是更低的心血管疾病风险大致的形象也是表意不明的短语

没有任何意义把它删去，仅仅说降低心血管疾病风险句子意思并没有少了什么我们再看看，降低血压水平单词“水平”并不是必要的我们就直接说：降低血压最后一句话：增强肌肉和心肺功能这仅仅是健身的另一种说法所以我们可以删去这句话替换为健身因此,我们得到：健身活动与降低心血管风险降低血压有关,提高健康。你可以看到我们删去了多少句子中的冗余其实在这个例子中，我觉得我们可以更直接因为我认为我们已有充足的科学证据表明多健身可以降低心血管疾病风险、降低血压和改善健康当然这需要很有说服力的证据但我认为我们可以确定的说锻炼有这些直接的影响这里是最后一个例子实验结果显示的是是同类中的第一个原理验证关于激光驱动粒子在真空装置中加速我们首先看这里我觉得与其说：实验的证据不如说：实验后面:是同类中的第一个原理证明可以看到这里有两个be动词这些动词很无聊，我们可以直接在这里加一个be动词于是变为：第一类的一个原理验证我觉得这太重复了这是相同的意思所以我们可以直接说：这个实验提供了第一个原理验证直接浓缩为：第一个原理验证下面是：关于激光驱动粒子加速的概念我觉得我们不需要这个概念，这个词很空洞所以直接是：一个关于激光驱动粒子加速的原理验证最后这段话成这样

这个实验第一次提供了关于激光驱动粒子加速的原理验证在这里我想感谢科罗拉多大学博尔德分校的Debra Biasca，我的幻灯片里有许多物理中的写作例子是她分享给我的好了，我希望你们养成删去废话的习惯你需要同时保持谨慎和残忍删自己的话是很难因为你花了很多精力去写这些写它们的时候磕磕跘跘的你会觉得把这些话删去你的努力就白费了而且这些话可能是你在脑子中过了好多遍才变得比较好听你会觉得就这样是最好的而你现在要做的就是改掉这种惰性和自我满足感你需要激励自己去回过头来看看那些句子删去废话试着删除多余的词再重读整个句子看是否变得更好感受它是如何更强力地传递同样地思想我经常告诉学生你有撤销键作为后盾使用ctrl+Z键在苹果系统上也有同样功能的按键所以你尽可以把那些词汇删掉然后重读句子如果你不喜欢新的版本你总是能使用ctrl+Z键回退到之前的版本我自己就经常这样做我会说好吧我还是想把单词留在哪里我不想删掉它但我确信自己尝试过删掉这些单词我知道自己可以用ctrl+Z键回退但我从没有再把那些单词放回去删掉它们几乎总是更好的现在来看另一个例子，这是个非常好的句子：在几乎所有的报道中，脑损伤事件都有两个高发期青少年和老年人的发病率最高，好吧。但是，与下面这个句子相比：脑损伤发病率高峰在年轻人和老年人看看第二种句子的表达多干脆多利落当我们删去不必要的单词后这有一些常见的冗余的来源，你应当注意一下首先，尾大不掉的的单词和短语众所周知，它已被证明，它被认为是，应该强调的是这些词句仅仅是作者在清他们的嗓子它们均可被删去直接提供引文证明它是众多周知的就可以了另外，注意一下空洞的单词和短语这类词并不会添加任何东西,因为它们是如此的模糊和空洞。我喜欢威廉辛瑟这句话,他说,一些单词和短语是斑点。而这确实是真的,有些单词和短语是如此的模糊。它们并不起任何作用另外,要注意一下能够被缩短的长单词或短语。记住,增强肌肉和心肺功能,这只是一个花哨的方式来说健身。你不妨使用简短的版本。注意不必要的术语和缩写。肌肉和心肺表现。我们在前面的课堂中看到的：胶质磁力miR,首字母缩写词的使用。我们要避免首字母缩写词,除非它们是完全标准的并已被整个学术界公认的。我们也想去除不必要的重复。我们之前已经看过了这方面的一些例子。我们看到了研究。例子表明和证明。挑战和困难。成功的解决方案。这有一个例子：形容词重复了名词中的内容。所以要小心这种重复。最后,还要注意副词。每个人都喜欢加副词，在电子邮件中或初稿中你会注意到我喜欢在说话加副词,但在你的写作中,我会要求你回去把它们删掉,因为它们几乎从来没有用处。它们只会使你的句子更加笨重添加副词并不能使你的观点或陈述更有说服力。事实上,你会失去说服力。所以,我想让你去掉那些副词：很，相当,非常，基本上,一般,等等。下面是几个可以简化的长单词和短语的例子。我有很多这样的例子,我们将做些练习。A majority of可简化为most。A number of可简化为many of the same opinion，I love that one就是agree Less frequently occurring,直接说rare就行.All three of the,直接说the three就行.Giver is eto,就是caused.'Due to the fact that'就是because, have an effect on'就是affect;你就懂了。这些单词和短语并不表达句子的主要意思,所以他们只是让你的读者阅读速度慢下来当你选择一个长版本时,一个简短版可表达同样的意思下面是一个长短语可以被简化的例子。智力迟钝的预期流行率,约2.5%，基于猜想,智力呈正态分布。嗯,另一种“基于猜想”的说法,是直接说“假设”。假设智力是正态分布的。下面是重复的一个例子。这句话有一个重复。一个强大的细胞介导的免疫反应是必要的。缺少这个反应会使个体更易得活动性结核病。请注意,这句话的两个部分实际上是说的同一件事情。有一部分说它是必要的另一部分说,如果你没有它,坏事就会发生。所以,我们可以表达同样的观点，如果我们只是说,"缺乏T细胞介导的免疫反应使个人容易受到影响活动性结核病。我们不需要这句话的第一部分。这里有一个引言去结束去除冗余这是一句名言Pascal说我只会在一种情况下写长长的信那就是因为我没时间去简化它我的法语有点生疏了，所以我不会试着去法语说这句话这就是你写作中的优雅之处。现在你们中的大多数人可能都参加了高中或大学的课程告诉你必须填写一些东西,也许是一个10页的报告。而在那个年龄,你可能没有近十页的观点。所以你开始学会用很多辞藻堆积来填充你的写作。你养成了这个坏习惯。现在我想让你改掉这个习惯并学会删除你写作中一切不必要的东西。总结为关键的点。当你用最简明的词语表达你的想法时,你的写作更具可读性、吸引力和说服力。这个课程的前学生约翰·霍奇斯很热心，他找到了了引言的的原始出处并和我一起分享,所以我想在这里和大家分享原文。谢谢你,约翰,谢谢你把这个挖出来。