

**Subject:** Re: what do software engineers make?  
**From:** Joseph Picone <joseph.picone@gmail.com>  
**Date:** 7/22/23, 1:01 PM  
**To:** ECE 1111 <temple\_engineering\_ece1111@googlegroups.com>  
**CC:** nedc\_research <nedc\_research@googlegroups.com>

A question that often comes up is: if I am pursuing a BS in Computer Engineering (at Temple this means you are taking the CpE option in ECE), should I pursue a minor in computer science?

Here is my very personal (and strong) opinion on this:

If you are a good student, meaning your GPA is above 3.25 in your engineering courses, you should and will get an MS degree. We often say "a master's degree is the new bachelor's". An MS degree gets you a better type of job, gives a good return on investment, improves your quality of life, etc.

Further, for engineers, your MS degree is either paid for by your employer, or by the university if you are a funded graduate student. So all it costs you is time.

On the other hand, I do not say the same about a PhD – a PhD is not for everyone.

So... should you get a minor in computer science?

As a CpE, you will learn enough programming. You will also learn the basics of computer science. I prefer students to graduate as soon as possible, and, in senior year, if you have hours to burn, take some grad classes that will apply to your MS degree (like my machine learning class 😊)

In other words, don't slow yourself down getting a minor. Take as many software classes as possible, but spend the time accelerating your MS degree. Prolonging your BS degree doesn't make sense fiscally and professionally – better to use that time towards your MS degree.

However, you do need to get a full range of software classes in your curriculum. I created the sequence Engineering Computation 1–IV for precisely this reason. We want even our EE and BioE students to have good software backgrounds.

Many of you should consider taking EC III (ECE 3084), which introduces you to Internet programming and software engineering – what is called full stack development. It is very important that you understand how to make devices Internet-aware and how to develop Internet apps if you want to have a career as a software developer. Employers will be very impressed when they see EC III on your resume.

–Joe

=====

On 7/22/23 12:14 PM, Joseph Picone wrote:

One of the things we will talk about in this course is your professional development. Students pursuing degrees in electrical engineering tend to focus more on hardware; computer engineers focus on embedded systems; bioelectrical engineers focus on medical devices.

The upper end of the salary spectrum for careers in software has been exploding in recent years due to the growth in the Internet (full-stack developers) and artificial intelligence (data scientists). This is one of the reasons I teach this course – I want you to be able to qualify for jobs in software.

Google is one of the companies that despite large layoffs this year, is paying top dollar for good software engineers:

<https://www.dailymail.co.uk/news/article-12326073/Google-salaries-revealed-Tech-giants-based-workers-receiving-average-279-802-year-software-engineers-rake-1-3-million-isnt-best-ones.html>

Even when you factor in cost of living, Google is paying very well. In fact, the so-called FAANG companies (Meta (formerly Facebook), Amazon, Apple, Netflix, and Alphabet (formerly Google)) all pay top dollar for good engineers.

There is no end in sight in the demand for software engineers. Jobs in hardware, on the other hand, have been increasingly moving out of the U.S., or shifting from devices to embedded systems. It appears there is going to be a push to restart semiconductor manufacturing in the U.S., so we will see growth in microelectronics opportunities in the next 5 to 10 years. We haven't seen high salaries in these fields for a variety of reasons that are beyond the scope of this email and a discussion for another day.

Just some things to think about... the choices you make in your UG program will have a long-term impact on your quality of life.

-Joe