

**HARDWARE RECOMMENDATIONS BASICS FOR CGT MAJORS** Fall 2020

Because it is highly important for productivity of students within Computer Graphics Technology to have an adequately powered computer, this guide is being written with the hopes to give simple and direct suggestions for hardware within the entertainment graphics areas. The computer examples used in this document are all laptops, all of the same stats and numbers apply to desktops as well, but the pricing may be different.

So why start learning this subject? If you plan on working on computers for the next four years and beyond, it makes sense to take some time to start to learn how to pick a computer and which features are important for your area of study.

**Production Goals**

What are you going to be doing on these machines anyway? Well I am glad I asked you. Here is a summary:

**Games:** Work in content creation apps like Maya, Houdini, ZBrush, Blender, Substance and Photoshop to send content to game engines like Unreal or Unity to create real-time experiences.

**Animation/VFX:** Work in content creation apps like Maya, Houdini, ZBrush, Blender, Substance, and Photoshop to render sequences and send items to Fusion/Nuke/After Effects, Premiere Pro/Da Vinci Resolve for a final video.

**Web Design:** Work in content creation apps like WordPress, Photoshop, and Premiere Pro.

**Hardware Terms**

Below is a list of hardware terms. This is not at all an exhaustive list, however knowing these terms should help to inform the most important features.

**CPU:** Central Processing Unit – This is the brains of the computer, in simplest terms, it crunches the math or calculations. Usually you will hear terms like “cores” and GHz (Gigahertz) when CPU’s are discussed. Usually the more cores the better (and more expensive), but 4 or more cores right now in mid 2020 is still common and will suffice; however, it is becoming more common, even in laptops, to see 6 cores or more. While the cores are important, the speed of the core is important too. Gigahertz or “GHz” is used to describe the speed of each individual core (higher is better). For rendering and simulation purposes, more cores are better, but in some cases this may not be the case; if I had to choose between 8 cores at 1.75 GHz or 6 cores at 4 GHz a core, I would pick the 6 core CPU. The reasoning is that the 4 GHz a core will finish each task so much faster than 1.75 GHz that the extra cores may not be as much of an advantage. Typically, when looking at CPU’s the higher the number, for instance: An Intel i9-9900k is faster than an Intel i7-9700k, or an AMD Ryzen 9... is faster than an AMD Ryzen 7...

**GPU:** Graphics Processing Unit a.k.a. "Graphics Card"- This is the what processes the graphics that are seen on the screen. This is an important aspect for anyone creating 2D and 3D graphics. For that reason, it is imperative that when purchasing a computer that the computer has a dedicated graphics card inside. Typically, the way to know this is if you see something that says "Nvidia..." or "AMD...". If the computer says "Intel integrated graphics card" you will want to stay away from that computer. Just like CPU's, GPU numbers are the higher the better: a Nvidia RTX 2080 is faster than a Nvidia RTX 2070.

**RAM:** Random Access Memory – This is the memory that the computer uses while it is running to load programs into but is lost the moment you turn the computer off. Basically, the more RAM, the more programs you can run simultaneously. Just as a baseline, when purchasing a new computer, no less than 16GB of RAM is required. If you have a computer with less RAM, it can work, but you may run into slowdown and poor performance.

**Storage** a.k.a. "Hard Drive"- Like RAM, this is memory, however this is the permanent memory that all of your files, operating system and programs are stored on. In the old days hard drives (HD) would all be spinning units, so you might still see 7200 RPM or something like that for the HD, however it is much more preferable and reliable to get a "Solid State Hard Drive" a.k.a. SSD. Solid state hard drives are kind of like the USB memory sticks but connected with much faster connectors. There are currently two types of connectors for SSD's: SATA or PCIe M.2. The PCIe M.2 SSD's are faster, but a SATA is not slow either and cost less. It is preferable to have at least 1TB (TB = terabyte) of HD space. It is also a good idea to get a backup HD which is commonly known as a "Data Drive". The backup drive can be a standard 7200 RPM HD to save on money. So that is a summary of the parts that are most important to consider, next we will put together some common numbers that will equate to a different tier of computers for graphics creation. We will consider your major as well.

## **PC Configurations**

I will list some simplified stats here and prices, and afterwards I will discuss specifics that should be considered for each major mentioned in the title.

### **Low End PC stats:**

CPU:  
Intel i7-9700k or AMD Ryzen 7 3700X Processor  
GPU:  
NVIDIA GeForce GTX 1660Ti 6GB  
RAM:  
16 GB  
Storage:  
1 TB SATA SSD

**Approximately \$1,279**

### **Mid End PC stats:**

CPU:  
Intel i7-9750H Processor or AMD Ryzen 7 3750H  
GPU:  
NVIDIA GeForce RTX 2060 6GB  
RAM:  
16 GB  
Storage:  
1 TB SATA SSD

**Approximately \$1,479**

**High End PCstats:**

CPU:

AMD Ryzen 9 3900 Processor or Intel i9-9900k

GPU:

NVIDIA GeForce RTX 2070 8GB

RAM:

32 GB

Storage:

1 TB SATA SSD

**Approximately \$1,899****Apple Products for Game/Animation/Web Development**

Apple does not use Nvidia graphics cards, they use AMD cards. AMD cards can be powerful cards and work well. If you decide to buy an Apple product, follow the same guidelines above for specs; currently the highest end MacBook Pro has 8GB of Video RAM (there is not 6GB RAM option). 4GB of video RAM is not enough for VR and should be avoided if VR is an area of development you are interested in. Typically for VR you want no less than 8GB of Video RAM, though it can run on 6GB of Video RAM.

**Considerations for Your Major****Game Major**

For games the primary concern will be a powerful graphics card. Not to favor a company, but Nvidia graphics cards are more versatile and have specific accelerators (called CUDA Cores) that make them more attractive than AMD cards. AMD cards are fine cards, but many content creation programs are utilizing the special architecture put into Nvidia cards to accelerate the production outcomes. Most games are not developed to use more than 4 CPU cores, so getting a higher GHz number takes a precedence for in-game performance. However, if you can, getting more cores should be considered if the GHz number is adequate.

**Animation Major**

Animation Majors should go for a balance between CPU multi-cores and GPU strength. The reason for this is that in animation you will need a decent GPU for having all of the models and textures loaded into an animation program like Maya, but when going to render, most renders rely on the CPU for calculation. So you would do well to have as many CPU cores as possible, without neglecting the GPU either. There is a new trend towards using the GPU for rendering, and it is a very powerful and fast solution, however most renders built into software is still CPU based at this point. RAM may be another statistic to consider in order to have large scenes and multiple programs running at once, if you can upgrade to 24 GB or 32 GB, you'll be thankful in a few years.

**Web Design Major**

Web majors don't require the computer demands of the Games or Animation majors. There are several laptop choices that include the Intel Core i7 processor, 16 GB RAM, 4 GB of video memory with 512 GB SSD based storage.

## **SPECIALTY ITEMS: TABLET AND TABLET COMPUTERS**

If you fancy yourself a 2D animator or concept artist type, there are a number of other considerations that may interest you. First, you may consider getting a tablet PC that allows you paint or digitally sculpt right on the screen with a stylus. Another path would be to get a graphic tablet. We will talk about the tablet PC first. There are many on the market, but two that come to mind is the Windows Surface Pro line, and at the highest end the Wacom Mobile Studio Pro. These can work for content creators and eliminate the need for a separate tablet, however getting either of these with similar specifications discussed above is impossible and getting close to CGT recommendations is a steep price tag for most. Alternatively, the least expensive option is to get a simple small graphic tablet that can fit in the bag with the laptop and be plugged in whenever needed. A \$80 *Wacom Intuos S Black* is a small tablet like this, and many professionals (myself included) started on one of these. If you want an upgrade to a screen tablet, there are many screen display tablets. Wacom's Cintiq was the first major commercial version of a screen tablet hybrid, but even the newer iPad Pro and an apple pen can be plugged into a pc and used as a drawing screen.

Oh, and one other thing...

A mouse, you will also need a mouse for many applications; a trackpad does not offer enough functionality.

<https://engineering.purdue.edu/ECN/Support/KB/Docs/StudentLaptopsuggesti>