

17 October 2024

COMPUTER RECOMMENDATION FOR ENGINEERING STUDENTS IN 2025

Students in the BEng programs make regular use of personal computers. All undergraduate students of the Faculty of Engineering have access to the Faculty's computer user's area (FIRGA/FECUA) for 24 hours per day, 7 days per week. In FIRGA all the software required in the BEng programs is available, as well as internet access and printers. However, many students are more productive if they have their computer at their place of residence. Any assistance to students in obtaining a computer for personal use is therefore of substantial benefit.

Desktop or Laptop



Currently, laptops are by far the more popular choice. They are mobile, and the importance of battery power during load shedding cannot be overstated. A modestly priced laptop will be powerful enough for all the Engineering Faculty's software requirements. Traditional desktop (non-mobile) systems have much more space than laptops, and thus far more powerful hardware can be crammed in there. For complex simulations, desktops are thus a good choice, but students will find that most departments have these available for their use, or they can make use of the desktops in the computer user areas.

Recommendation: Laptop

Windows, Macintosh, and Linux



Whilst many of the big software developers release their software for all available Operating System (OS) platforms, many of the smaller companies release it for Windows only, which is still the most popular operating system for personal use. Students will run into situations where the software will not natively work on their Mac or Linux system. Whilst there are

workarounds for this it is often tedious and requires some degree of computer expertise. It should also be noted that Campus IT has limited support for Mac and Linux systems, and students with these systems can expect longer turnaround times when logging faults.

Recommendation: Windows System, but Mac or Linux can be used if the student does not mind the extra hassle.

32-bit vs 64-bit.

A few years ago, all operating systems were released as 32-bit. These operating systems can only address up to 4GB of RAM, far below the minimum requirement of many of the software packages used in the faculty. Moreover, some of the bigger software developers nowadays only release 64-bit versions of their software.

Recommendation: A 64-bit OS or 32-bit should not be considered.

RAM Requirements (Random Access Memory)



The most demanding software, in terms of computer resources, that all first-year BEng students use is Autodesk Inventor. Autodesk 2024 has seen a big ramp-up in system requirements from previous years, which is expected to continue. The *recommended* requirement for Inventor is 32GB of RAM; however, 8GB of RAM would still be adequate, albeit slower. When purchasing a computer and going for the lower-cost options it is advisable to confirm whether the RAM can be upgraded at a later stage as there is a chance that 32GB could be the *minimum* requirement in the next few years. When a computer runs out of RAM, it uses hard drive storage space for virtual memory. Thus, a fast hard drive is recommended on systems with smaller amounts of available RAM.

Absolute Minimum Requirement: 8GB of RAM, with the possibility of upgrade.

Recommendation: 16GB with the possibility of an upgrade.

CPU Requirements

Intel:



With Intel, there are four considerations to take: the core type, the core count, and the generation. As a rule of thumb, the i3 will be the slowest, the i5 will be in the middle, the i7 will also be in the middle and the i9 will be the fastest. Lately, however, CPUs have all become so fast that students will not notice a major difference in the running of software applications between the four types. More important is the core count, the more cores a CPU has the more calculations it can do at once. In 2025 six cores or more should be considered, however, two or four cores would still suffice. Lastly, the generation number indicates new Intel architecture releases. Generation 9 came out in 2019 and is the recommended minimum. Generation 13,

which came out in 2023 has much faster graphics capabilities (covered in the next section) than generation 9 and should be considered a far better option.

Absolute minimum requirement: Any CPU that scores over 2000 points on <https://www.cpubenchmark.net>

Please note when you buy a laptop with an Intel chipset, we do not recommend the Intel Celeron chip, however, look for the Intel Core i3, i5, i7, i9.

Recommendation for Intel: 5TH Generation or higher i5, i7, or i9 Intel CPU with at least six cores, 7TH Generation and higher strongly recommended

AMD



AMD has mostly lagged behind Intel, but in 2019, they released the third-generation Ryzen CPUs that surpassed Intel for the most part and took the world by storm. These CPUs have high speeds and low power usage, and the versions that come with graphics have very powerful and fast graphic capabilities and are generally cheaper than their Intel counterparts. Second-generation Ryzen CPUs also have excellent speed and graphics capabilities.

Absolute minimum requirement: Any CPU that scores over 2000 points on <https://www.cpubenchmark.net>

Recommendation for AMD: Any second-generation Ryzen CPU with built-in graphics and four or more cores, but third generation if costs allow.

****It should be noted that Ryzen and core i3/i5/i7 are not the only makes of the respective manufacturers but can be the baseline for comparison when considering other makes.***

Graphics Requirements



Computer graphics cards come in two main flavors integrated and dedicated. An integrated graphics card shares power and memory with the CPU and RAM, and whilst slower than a dedicated card, it is much cheaper. Dedicated cards are stand-alone powerhouses with their RAM and CPUs, but are much, much more expensive, often out costing all other components of a computer. These are usually in desktops (but can be in laptops too), and their usage often accompanies games and high-end graphics applications such as video editing. For student usage, an integrated graphics card that comes with a 2nd generation or higher AMD or a 6th generation or higher INTEL CPU would be adequate. It should be noted that from the 7th generation, Intel integrated graphics are much faster.

Absolute minimum requirement: Intel HD or UHD integrated graphics.

Recommendation: At least 2nd Gen AMD or 6th Gen Intel integrated graphics.

Hard drive Requirements



In the past, all hard drives had mechanical, moving parts, and these were notably slower than the more modern solid-state (SSD) and Non-Volatile drives (NVME) we have today. SSD and NVME drives are much, much faster and make an extreme difference to overall system speed compared to traditional drives, especially on low RAM systems. SSD drives will be sufficient for all student requirements, and it is not yet necessary to purchase the far more expensive NVME drive, as the noticeable difference in speed will be negligible. Students receive 1TB (terabyte) of cloud storage from the university, so hard drive size is not that much of an issue unless the students want to use the computer for other things apart from studying.

Absolute minimum requirement: 240GB Mechanical Hard Drive but SSD strongly recommended

Recommendation: Solid State SSD Hard drive, 240GB and bigger

Summary of recommendations

(It should be noted that students can use lab computers to supplement their own devices, should it fall short for a particular program/application)

Absolute Minimum	Recommended
Laptop	Laptop
64 Bit Windows Operating System	64 Bit Windows Operating System
8GB RAM, Upgradable	16GB RAM, Upgradable
Intel Core i5 or AMD Ryzen 2 nd Generation (Intel Celeron – not recommended)	9 th Generation or higher Core i7 Intel CPU, or AMD Ryzen 2 nd Generation or higher (Intel Celeron – not recommended)
240GB and bigger Mechanical Hard drive	240GB and bigger SSD Hard Drive
Intel HD or UHD Integrated Graphics	Integrated graphics that come with the recommended CPU above

Examples of absolute minimum: (October 2024)

Dell Inspiron 15 3520

Intel Core i5 12th Generation Laptop



15.6" Full HD Anti Glare Display
Intel Core i5 12th Gen 1235U up to 4.4GHz
8GB DDR4 RAM
512GB M.2 NVMe SSD
Intel UHD Shared Graphics
WiFi
Bluetooth

ASUS Vivobook 15 X 1502Z

Intel Core i7 13th Generation Laptop



15.6" FHD (1920 x 1080) 16:9 aspect ratio LED Backlit Anti-glare display
Intel® Core™ i7-12700H Processor 2.3 GHz (24M Cache, up to 4.7 GHz, 6P+8E cores)
16GB DDR4 on board RAM
512GB M.2 NVMe™ PCIe® 4.0 SSD
Intel Iris X® Graphics

Student licenses are available for most of the software that BEng students need. [Software List](#) gives details about the software available to Stellenbosch University students for installation on their devices (for example MS Office 365 is available free of charge). The Engineering Faculty is also part of the Microsoft Ignite Premium program that makes certain Microsoft products available to our students at no cost or a very low fee. More details here: <http://rga.sun.ac.za/firga/microsoft>