Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

Engineering EyobuNjineli Ingenieurswese

COMPUTER RECOMMENDATION FOR ENGINEERING STUDENTS IN 2023

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) 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 own computers 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 "box" space than laptops, and therefore 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 only release for the Windows OS. Windows remains the most popular operating system for personal use. Students will run into situations where some software that is required 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, 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 Inventor 2022 has seen a big ramp-up in system requirements from previous years, and this trend 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 starts using hard drive storage space for virtual memory. Thus, a fast hard drive is also 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 three considerations to take into account: the core type, the core count, and the generation. As a general rule of thumb, the i3 will be the slowest, the i5 will be in the middle, and the i7 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 three types. More important is the core count, the more cores a CPU has the more calculations it can do at once. In 2022 four cores or more should be considered, however, two cores would still suffice. Lastly, the generation number indicates new Intel architecture releases. Generation 6 came out in 2015 and is the recommended minimum. Generation 7, which came out in 2017 has much faster graphics capabilities (covered in the next section) than generation 6 and should be considered as 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. Rather consider the Intel Core i3, i5 or i7 chips*

***Recommendation for Intel**: 6TH Generation or higher i3, i5, or i7 Intel CPU with at least four cores, 7TH Generation and higher strongly recommended.*

AMD:

AMD has mostly been lagging 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 generally were 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 budget permits.*

****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 flavours: 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 own 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 a significant 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 noticed difference in speed will be negligible. Students receive 500GB of cloud storage from the university, so hard drive size is not that much of an issue any longer, 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 i3 or i5 or AMD Ryzen 2nd Generation (Intel Celeron – not recommended)	6th Generation or higher Core i7 Intel CPU, or AMD Ryzen 2nd Generation or higher
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 as above

Example of absolute minimum: (January 2022)

Asus 39cm (15.6") X543 Intel Core i3 Laptop

Operating System	Windows 10 Home
Processor	Intel Core i3-7100U (Up to 2.40 GHz)
Memory	8 GB RAM
Storage	1 TB hard disk drive
Graphics	Intel HD Graphics
Optical Drive	No
Display Size	39 cm (15.6")
Display Resolution	1366 x 768
Touch Display	No
HDMI Input	Yes
USB Ports	3
SD Card Reader	Yes
Connectivity	Wi-Fi and Bluetooth

Example of recommended: (January 2022)

HP Pavilion 15 x360 Core i7 1165G7

HP Pavilion 15 x360 Core i7 1165G7 16GB RAM 512GB SSD Storage 2-in-1 Laptop

Product Code: 0000000000010269035

- Windows 11 Home
- 15.6" FHD
- 16GB and 512GB SSD Storage
- Intel Core i7 1165G7 Processor
- Intel Iris Xe Graphics
- HP Wide Vision 720p HD Webcam
- Realtek Wi-Fi 6 & Bluetooth 5.2 Combo
- 1 microSD media card reader

Stellenbosch University also participates in the national Student Technology Program (http://www.stp.ac.za/) which provides students with some benefits regarding a variety of computer options.

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 own device (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