27 November 2020

COMPUTER RECOMMENDATION FOR ENGINEERING STUDENTS IN 2021

Students in the BEng programmes 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 programmes is available, as well as internet access and printers. However, many students are more productive if they have their own computer at their place of residence. Any assistance to students for 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 and 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 for Windows only, which is still the most popular operating system for personal use. Students will run into situations where 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 have 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's 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 2021 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 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 upgrade.

CPU Requirements

Intel:

With Intel, there are three considerations to take: 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 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 2021 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 next section) than generation 6 and should be considered a far better option.

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

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

AMD

AMD has mostly been lacking 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, 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 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 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 accompany 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 makes 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 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, unless the students wants 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
CPU that scores >2000 on cpubenchmark.net	6th Generation Core i3,i5 or 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: (November 2020)

HP 250 G7 Intel Celeron Dual Core N4020 up to 2.80GHz Processor, 4MB Cache, 2x Cores, 2x Threads / 8GB DDR4 RAM / 500GB Hard Drive / 15.6" HD 1366 x 768 Anti-Glare LED-backlit Display / Integrated Intel UHD Graphics 600 / Windows 10 Home 64bit / DVD Writer / Realtek RTL8821CE 802.11ac Wireless LAN / Bluetooth 4.2 / SD Card Reader / HD Web Camera / 1x USB 2.0 / 2x USB 3.1 / 1x HDMI / 1x Audio In And Out Combo / Full-Size Island Style Keyboard / 2x Integrated Stereo

Example of recommended: (November 2020)

[TOUCHSCREEN] Lenovo ideapad C340-14IWL 8th Gen Intel Whiskey Lake Core i3-8145U up to 3.9GHz Processor, 4MB Cache, 2x Cores, 4x Threads / 16GB DDR4 RAM / 256GB Ultra-fast NVMe SSD / 14" HD 1366x768 220nits Glossy Display With Multi-Touch Screen / Integrated Intel UHD Graphics / Windows 10 Home (64bit) / HD 720P Web Camera / White Backlit keyboard / Fingerprint Reader / Bluetooth 4.2 / 802.11ac Wireless LAN / 2 x 2W, Dolby Audio™ speaker system / 4-in-1 Card Reader / 2 x USB 3.1 Type-A / 1 x USB 3.1 Type-C / 1 x HDMI / 1 x Headphone & Microphone Combo Jack / Ultra-Light 1.6kg / 3 Year Fetch & Repair Warranty / Up to 8 Hours Battery Life /

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. IT Student Services wiki (access to this wiki requires a Stellenbosch University student or staff login) gives details about the software and services 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 at a very low fee. More details here: http://www.firga.sun.ac.za/microsoft.html.

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