Elective advice for Computer Engineering students

The Computer Engineering program (3707 COMPBH plan) was revised during 2023 and the new plan commenced in 2024. The main changes to the program were to replace MATH2069 Mathematics 2A with MATH1081 Discrete Mathematics as a core course and to add COMP3222 as a prerequisite to COMP3601.

As before, students are required to complete 24 units of credit (UOC) of Discipline Electives (principally level 3+ COMP courses, but ELEC, TELE, PHYS and MATH – as examples - may also be considered). Students are required to complete 12 UOC of Discipline Electives at level 4 (COMP4xxx, COMP6xxx and COMP9xxx, but excluding COMP902x). Students may use their 12 UOC Free Electives to complete additional Discipline Electives if they wish.

Consultation with students leading up to the revision suggested you would like additional guidance regarding elective choice. This advice has been prepared by the Computer Engineering teaching staff in the hope that it will help.

Complementing the core
The revision to the program was based on the [2016 Computer Engineering Curriculum report published by ACM and IEEE](). This report suggests that our Computer Engineering curriculum would benefit from including courses in algorithms, networks, and security. We therefore suggest considering taking one or more of COMP3121 Algorithms and Programming Techniques, COMP3331 Computer Networks and Applications, and COMP6420 Hardware Security as discipline electives.

Leaning towards Electrical Engineering courses
Numerous level 3 ELEC courses assume students have completed MATH2069 as they are founded on a deeper understanding of and competency in complex analysis. Students that are interested in the following electives offered by the School of Electrical Engineering and Telecommunications should consider taking MATH2069 as a free elective or substituting MATH2069 for MATH1081. This applies particularly to students wishing to take the following level 3 courses and their more advanced level 4 derivatives:

> ELEC3104 Digital Signal Processing
> ELEC3106 Electronics
> ELEC3114 Control Systems
> ELEC3705 Fundamentals of Quantum Engineering
> TELE3113 Analog & Digital Communications

Thinking ahead to your future career
If you have a clear idea about what sort of career you are looking for or the industry you would like to work in, let this inspiration help guide your elective choice. Computer Engineers work in many industries performing many different roles. There is strong interest in employing engineers with experience in signal processing, computer vision, AI and robotics. The roles performed typically range from systems analysis (with an emphasis on computer systems, networks, embedded systems etc.), design, development, procurement, maintenance, and management. In Australia, the industries employing computer engineers include manufacturing, mining, telecommunications, banking and finance, health, utilities – the list is almost endless. If you have some ideas about subject electives you'd like to discuss, please talk to one of your lecturers. It really doesn't matter whom you approach to start the conversation.

Related online resources
YouTube: [What Do Computer Engineers Do? | What is Computer Engineering? | Jobs for Computer Engineers](#)
Indeed.com: [What Is a Computer Engineer and What Do They Do? (Plus FAQ)](#)

Graduate comments

"I am very glad that I took courses like Electronics and AOS, as they have helped deepen my understanding of the boundaries between the different facets of computer systems, and as such allowed me to more effectively troubleshoot low-level issues in the systems I work with."

"When it comes to DSP, I was thrown in the deep end and floated eventually, but I definitely wish I had a formal introduction to the topic. DSP (alongside AI/ML) seems to be an increasingly prevalent use-case for FPGA systems, so it is worthwhile understanding some of the basic theory behind DSP."

"From my role and observations being more of an embedded engineer, things I wish I learned a little more about and courses that seems to cover it include:

- **ELEC3145 Real Time Instrumentation** (RTOS, control systems, PID) - most industry embedded roles in Aus use RTOS and control systems are quite important for real-time systems
- **ELEC3104 Digital Signal Processing** (general DSP) - Sydney in particular has plenty of audio and bio related roles and they generally do a lot of DSP
- **ELEC4622 Multimedia Signal Processing** - A few Australian companies are really good in the pro video space and Prof David Taubman is really renown in this space (companies: Blackmagic, Audinate, etc)
- **COMP3411 Artificial Intelligence** - Every company is looking at ways to make their systems smarter, even for resource-constrained edges, having fundamental understanding would be helpful. Would be interesting if there are any courses that teaches ML systems and the computation optimisation side of ML (hot topic in research and industry)
- **COMP3131 Programming Languages and Compilers** - Adding this because this is one of the courses I really wish I took. Mostly because I want to do research in HLS as well and it has a larger emphasis on compilers. Maybe not as vital for industry roles but it's good to have understanding on how languages are synthesised to optimise code, particularly for embedded work.
- **Rust or C++ courses** - They have good reputation, and the discussion on whether to move to Rust has been happening for a while in the last years.."