E18 Field Introduction

Computer Engineering

If you have questions, please drop an email or contact on WA
Academic stuff:  https://gihan.me/contact/
Industry stuff:  chandima.s@eng.pdn.ac.lk (071 969 239 8)
Disclaimer

This presentation is made by Gihan, Suren and Chandima to share their personal opinions about the Department of Computer Engineering, University of Peradeniya with the E18s considering the department during field selection.

Gihan and Suren created the first part (academic programme) and Chandima created the second part (industrial aspects) and presented on 01st May 2021.

However, these opinions are not reflective of the stances held by their employees, affiliated organizations or the Department of Computer Engineering, University of Peradeniya.
Picking a field (1/2):

You don’t have to attend this session if your reasons are:

- Job: 49.0%
- Salary: 50.0%
- Other: 1.0%

Computer Engineering

Do what you are passionate about
Picking a field (2/2)

If your decision is based on everything, let us continue >>
Subtopics (1/2)

1. About the degree
   a. Prior knowledge
   b. Field selection
   c. Workload / results
   d. Accreditation
   e. Programming languages used?
   f. Internships
   g. Projects
   h. Subfields / courses
   i. Bio-medical engineering
   j. Collaborations
   k. Misconceptions

2. About the industry
Subtopics (2/2)

1. About the degree
2. About the industry
   a. First job
   b. Job opportunities in software and hardware.
   c. Salaries
   d. Stress
   e. Retirement
   f. Where we stand in comparison to other computer degrees? (CS, CSE, IT, CE)
Prior knowledge

Requirement: None

However,

1. Self-studying is always good for ANY field.
2. Programming languages are one of the few things you can self study almost completely.
- Computer has been the **top choice** in field selection for **3 years**. (earlier it was 2\textsuperscript{nd}).
- E17 cutoff was **3.10**. (E18s, maintain at least 3.3 for 2021)

## Difficulty / workload

E14 CO had 62 students.

The [google sheet](#) had information of __ students.

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade Range</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class</td>
<td>$\geq 3.70$</td>
<td>13</td>
</tr>
<tr>
<td>Second Class (Upper)</td>
<td>$3.30 \leq$ and $&gt; 3.70$</td>
<td>21</td>
</tr>
<tr>
<td>Second Class (Lower)</td>
<td>$3.00 \leq$ and $&gt; 3.30$</td>
<td>10</td>
</tr>
<tr>
<td>Third Class</td>
<td>$\leq 3.00$</td>
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FAQ : What programming languages will be used?

Short answer

Don’t worry about “knowing” programming languages. Different tasks will require different languages and you will be using them when time comes.

Ex: You don’t have to learn how to use a Bunsen burner to start with AL Chemistry. You will be using the burner for some lab practicals and you will learn it then.
FAQ: What programming languages will be used?

Long answer [http://www.ce.pdn.ac.lk/undergraduate-courses](http://www.ce.pdn.ac.lk/undergraduate-courses)

- ARM Assembly
- Verilog
- C
- Verilog
- Java
- MySQL
- PHP / Javascript
- MATLAB
- C (with registers)
- C++
- HTML, PHP, Java, Python
- C (with registers)
- C
- Java
- MATLAB
Accreditation, standards (1/2)


https://www.acm.org/education/curricula-recommendations
<table>
<thead>
<tr>
<th>Degree Programme</th>
<th>From (Intake Year)</th>
<th>To (Intake Year)</th>
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<tbody>
<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<tr>
<td>Specialty: Civil Engineering</td>
<td>2007</td>
<td>2020</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<tr>
<td>Specialty: Chemical and Process Engineering</td>
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<td>2020</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<tr>
<td>Specialty: Computer Engineering</td>
<td>2009</td>
<td>2019</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<td></td>
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<tr>
<td>Specialty: Electrical and Electronic Engineering</td>
<td>2008</td>
<td>2022</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<td>Specialty: Mechanical Engineering</td>
<td>2009</td>
<td>2019</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
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<td></td>
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<tr>
<td>Specialty: Production Engineering</td>
<td>2009</td>
<td>2016</td>
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<tr>
<td>Bachelor of the Science of Engineering Degree Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialty: Manufacturing &amp; Industrial Engineering</td>
<td>2017</td>
<td>2019</td>
</tr>
</tbody>
</table>
CO students getting scholarships/admissions

- E14
  (up to 2022 Apr)
- E13
- E12
CO students getting scholarships/admissions

E14s have got scholarships by now for all 3 major continents (Australia, Europe and North America)

These continents have different MS/PhD systems. Still, computer students get scholarships/admission to all of them. (= Peradeniya degree is valid everywhere)
CO students getting scholarships/admissions

- E14
  (up to 2022 Sept)
- E13
CO students getting scholarships/admissions

- E14
  (up to 2022 Sept)
- E13
- E12
Internships (1/2)

- Computer internship = **20 weeks** (usually, after the 6\textsuperscript{th} sem)
- Other internships = 10 weeks (usually, after the 4\textsuperscript{th} sem and 6\textsuperscript{th} sem)

- All computer engineering students get **paid** during the internships.
  - Why work for free for “experience”?
- More computer engineering students go for **international** internships.
  - New experiences, connections, exposure.
- More computer engineering students go for **research** internships.
  - This far, only the computer students have created actual research publications from the internships.
Internships (E13 onwards)
“Computer curriculum has so many projects” -- TRUE!

- What are the projects done by Computer department?
  - Course projects, unified projects and final year research project.
  - [Link](http://projects.ce.pdn.ac.lk/)
  - We have data from E15 final year and E16 unified projects.

- Why do we have a lot of projects?
  - [Next slides. Based on Dr. Asitha Bandaranayake’s explanation]
You come to the department with some basic knowledge.
The knowledge needed to get a management job is minimal.
Technical engineering jobs

Management jobs

Industry requirement

Management job requirement

But you need a higher set of skills to do technical engineering jobs properly.
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

Research career requirement

First year knowledge

MSc, PhD

And to do research as a MS/PhD student.
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

MSc, PhD

Research career requirement

You do courses for four years

First year knowledge

Subject 1
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

Research career requirement

You do courses for four years

Subject 1

Subject 2

MSc, PhD

First year knowledge
Subject 1

Technical engineering jobs

Management jobs

Industry requirement

Management job requirement

MSc, PhD

Research career requirement

You do courses for four years

Subject 3

Subject 2

Subject 1

First year knowledge

MSc, PhD

You do courses for four years

First year knowledge
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

Subject 1

Subject 2

Subject 3

Subject 4

You do courses for four years

First year knowledge

Research career requirement

MSc, PhD

You do courses for four years
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

Final year research project gives research experience

Subject 1

Subject 2

Subject 3

Subject 4

Final year research

First year knowledge

Research career requirement

MSc, PhD
Earlier, it was assumed that students with a good theoretical understanding will self learn and go to technical jobs.
In reality, most students (of all fields) got stuck in management jobs.
Course projects were developed to bridge this gap between **theory and practice**.
Technical engineering jobs → Final year research → MSc, PhD

Industry requirement

Management jobs

Management job requirement

Unified projects (projects where you get marks for multiple subjects) connects all the subject material.

First year knowledge
Technical engineering jobs

Industry requirement

Management jobs

Management job requirement

Final year research

Project

Subject 4

Project

Subject 3

Project

Subject 2

Project

Subject 1

MSc, PhD

Research career requirement

First year knowledge

Very few computer graduates go for management jobs
Subfields

- **Core: (around 9 credits per topic)**
  - Programming, networking, electronics, computer architecture (processor design), mathematics

- **Specialization with technical electives**
  - Artificial intelligence / Machine learning
  - Mathematics (+ pure CS)
  - Software engineering
  - Hardware engineering (processor design or embedded systems)
  - Networking (communication)

These are just words. Pick the **subjects** and **projects** you want to do.
Where does bio-medical engineering (BME) fit in?

This is a popular question because unlike in Moratuwa, there is no specific bio-medical department in Peradeniya.
Bio medical engineering

Treatment
Solutions that can help medical procedures.

Diagnostics

Genetics

Usually, treatments are not designed by undergraduate institutions in Sr Lanka. It is difficult to find such research groups here.
Bio medical engineering

Treatment  Diagnostics  Genetics

Usually, treatments are not designed by undergraduate institutions in Sr Lanka.
It is difficult to find such research groups here..
Bio medical engineering

Treatment

Diagnostics
- Sensors, developing equipment
- Signal processing
- Machine learning (to detect conditions)

Genetics
Bio medical engineering

Diagnostics

- Sensors, developing equipment
- Signal processing
- Machine learning (to detect conditions)

These techniques are taught in multiple courses even though there is no bio-medical specialization
Bio medical engineering

Treatment

Diagnostics

Genetics

Sensors, developing equipment

Signal processing

Machine learning (to detect conditions)

Many departments conduct such courses and research
Bio medical engineering

| Treatment | Diagnostics (Many depts) | Genetics = DNA sequencing |

This research area is active only in the computer engineering department.
Bio medical engineering projects in the computer department (two examples)

Diagnostics / sensing
(Many depts)

An Ensemble Learning Approach for Electrocardiogram Sensor Based Human Emotion Recognition
by Theekshana Dissanayake, Yasitha Rajapaksha, Roshan Ragel, and Isuru Nawinne
Department of Computer Engineering, University of Peradeniya, Peradeniya 20400, Sri Lanka
* Author to whom correspondence should be addressed.

Sensors 2019, 19(20), 4495; https://doi.org/10.3390/s19204495

Genetics = DNA sequencing
(Computer department only)

Genopo: a nanopore sequencing analysis toolkit for portable Android devices
Hiruna Samarakoon, Sanoj Punchihewa, Anjana Senanayake, Jillian M. Hammond, Igor Stevanovski, James M. Ferguson, Roshan Ragel, Hasindu Gamaarachchi & Ira W. Deveson
Communications Biology 3, Article number: 538 (2020) | Cite this article

Figure 1. SpikertShield Heart and Brain sensor.
Collaborations with other departments

- Mechanical Engineering
  - Reinforcement learning (control theory)
    - Eg: Quadcopters

- EE Engineering
  - Signal processing
    - Eg: Low light images

- Computer Engineering
  - Numerical packages
    - Eg: Structural analysis

- Civil Engineering
Computer engineering graduates in the industry
First job types (E14 as of 01/05/2021)

- All students (60)
  - Academic (9)
    - Research jobs (8)
    - Teaching (1)
  - Industry (others)
  - Startups (7)
    - Department startup (2)
    - Own company (5)
Job availability and starting salaries

- Computer has been the only field with **100% job guarantee** for many years.
  - *We know for sure about E12, E13 and E14.*
- The **highest, average and minimum salaries** of computer students have been higher than everything else for many years.
  - *We know for sure about E12, E14 and E14.*
  - *Highest 200,000+, average 160,000, minimum 130,000.*
  - This is not after analyzing everyone’s salaries.

- Keep your LinkedIn profile updated. Do diverse projects, follow online courses and get certified. You will be constantly receiving attractive job offers without even applying.
Software - Hardware split (in SL jobs) + Networking

1. FPGA / High Performance Computing - Paraqum, LSEG
2. Networking - SLT, Mobitel, Banks, LEARN
3. IoT - Codegen, Dialog
4. HDL / Digital Design - Synopsys
5. Firmware Development - Zebra Technologies
6. Cloud Infrastructure (AWS/Azure) - Almost all the software companies
FAQ : How stressful is software engineering?

- In some jobs, the engineering team has to deal with the questions raised by the clients. If your company is a multinational company, you may have to solve/answer them adhering to the guidelines quickly. (this is highly depend on the company, team you are working)

- Anyway, most of the software companies use agile scrum process. So, all you have to do is complete the tasks you are assigned within the time frame. So, you can take days off if you want as long as the task will be completed by the deadline.

- They organize multiple programs/events to relieve stress. Some companies even pay allowances in this WFH situation to participate in programs to improve your both mental and physical health.

- Finally all of them boils down to one thing! Handling stress is common for anything you do. If you love what you are doing and/or you get a proper compensation that’s what all matters. You have many options if you do computer engineering, so you can always pick a job which gives you more freedom. But you will have to always make a trade off between freedom and money!
FAQ : Why do many software engineers retire early?

- With the experience, you will get promoted, you will have to deal with the people management responsibilities. So you will not be doing just coding for the rest of the career.
- What we see is, with the experience, senior software engineers (Tech Leads) see more opportunities to grow themselves rather working for a company. So they usually start their own businesses or startups. Some of the biggest companies are born in that fashion in Sri Lanka.
- With enough experience, you have the option to be a full time freelancer, individual contractor or a consultant.
Comparison to other degrees (CE, CSE, IT)

“CS vs CE? Which is better?”

- Just check their course curriculums. Some degrees only focus on the latest technologies rather than the fundamentals.
Industry preparation at computer department

- 100% of the students go to internships by submitting CVs and facing interviews.
  - Rest of the faculty get assigned to internships by the ITCGU
- CV writing workshops.
- Mock interviews.
- Soft-skills workshops.
- Events to meet the industry
  - Hackathon
  - Coders
  - Career fair (Computer department has two career fairs = faculty fair and department fair)
Thank you for your time!

We hope you will

● do great in your first year exams,
● get enough GPA to do any field and
● do what matches you the best.
Summary

1. About the degree
   a. Prior knowledge
   b. Field selection
   c. Workload / results
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   e. Programming languages used?
   f. Internships
   g. Projects
   h. Subfields / courses
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2. About the industry
   a. First job
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   c. Salaries
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Home [http://www.ce.pdn.ac.lk/](http://www.ce.pdn.ac.lk/)

Projects [http://projects.ce.pdn.ac.lk/](http://projects.ce.pdn.ac.lk/)

Courses [http://www.ce.pdn.ac.lk/undergraduate-courses](http://www.ce.pdn.ac.lk/undergraduate-courses)

A few labs

[http://vision.ce.pdn.ac.lk/](http://vision.ce.pdn.ac.lk/)

[https://cepdnaclk.github.io/sites/labs/escal/](https://cepdnaclk.github.io/sites/labs/escal/)


Other content about field selection: [https://gihan.me/resources#field-selection](https://gihan.me/resources#field-selection)