Computer Engineering Program / course checklist for students who started 2nd year in Sep. 2020

Core Program Requirements		
COURSE	CREDITS	Y/N
ELEC 201	4 cr.	
CPEN 211	5 cr.	
CPEN 221	4 cr.	
CPSC 261	4 cr.	
MATH 253	3 cr.	
MATH 256	3 cr.	
MATH 220	3 cr.	
CPEN 291	6 cr.	
CPEN 281	3 cr.	
CPEN 331	4 cr.	
CPEN 311	4 cr.	
CPSC 221	4 cr.	
CPSC 320	3 cr.	
CPEN 391	6 cr.	
Breadth Electives	8 cr.	
Probability/Statistics	3 cr.	
CPEN 491	10 cr.	
CPEN 481	3 cr.	
APSC 450	2 cr.	
Advanced Electives	12 cr.	
Technical Electives	6 cr.	
Science Elective	3 cr.	
Compl. Studies	6 cr.	
Free Electives	6 cr.	
TOTAL CREDITS	115 cr.	

First Year Requirements		
COURSE	CREDITS	Y/N
APSC 100	3 cr.	
APSC 101	3 cr.	
APSC 160	3 cr.	
CHEM 154	3 cr.	
MATH 100	3 cr.	
MATH 101	3 cr.	
MATH 152	3 cr.	
PHYS 157	3 cr.	
PHYS 158	3 cr.	
PHYS 159	1 cr.	
PHYS 170	3 cr.	
WRDS 150	3 cr.	
Compl. Studies	3 cr.	
TOTAL CREDITS	37 cr.	

Probability/Statistics (3 credits):
One of **STAT 251, MATH/STAT 302, MATH 318**

COURSE	CREDITS

Electives

	Category	Course	Credits
	Complementary Studies (9 credits)		
	Humanities & Social Studies (1)		3 cr.
	Humanities & Social Studies (2)		3 cr.
	Impact of Technology on Society		3 cr.
	Breadth Electives (8 credits)		
	Breadth Elective (1)		
	Breadth Elective (2)		
	Advanced Electives (12 credits)		
	Advanced Elective (1)		
	Advanced Elective (2)		
	Advanced Elective (3)		
	Technical Electives (6 credits)		
	Technical Elective (1)		
	Technical Elective (2)		
	Science Elective (3 credits)		
	Science Elective		
	Free Electives (6 credits)		
	Free Elective (1)		
	Free Elective (2)		

Comments

Comment Regarding Program Changes Effective September 2021 Following the program changes that will be in effect for students that start 2nd year in September 2021, some of these changes will be applicable retroactively. Specifically, students may choose to not complete ELEC 221. In this case, students should follow the course checklist for students that started 2nd year in September 2020.	**Comments About Timing for Electives** Students have some flexibility in when certain electives are completed although it is typical for students to complete breadth electives in Year 3 and advanced electives in Year 4. It may be advantageous to distribute electives across Years 3 and 4 based on student interests.
General Comment Regarding Year-Level Advancement Students must complete 80% of the credits required for any given year to advance to the next year. Also, students that have not completed CPEN 281 will be restricted to 9 credits of 400-level courses until CPEN 281 is completed.	**List of Electives** The lists of approved electives appears later in this document. Generally one cannot apply a course to more than one requirement. The only exception to this rule is that up to 3 credits may also be double-counted towards the requirements for a minor and towards the free electives requirement. Also note that not all electives will be offered each year.

Electives List

Breadth Electives

COURSE	CREDITS	COURSE TITLE
CPEN 322	4 cr.	Software Construction II
CPEN 321	4 cr.	Software Engineering
ELEC 202	4 cr.	Circuit Analysis II
ELEC 221	4 cr.	Signals & Systems
ELEC 301	4 cr.	Electronic Circuits
ELEC 315	4 cr.	Electronic Materials & Devices
ELEC 331	4 cr.	Computer Communications
ELEC 321	4 cr.	Stochastic Signals & Systems
ELEC 341	4 cr.	Systems & Control
BMEG 310	3 cr.	Introduction to Bioinformatics

Notes:

1. ELEC 321 is also taught as STAT 321.
2. CPEN 322 before CPEN 321 is recommended.
3. BMEG 310: 4 credits of Biology coursework may be used to satisfy the BMEG 245 pre-requisite. One can choose a Science elective as appropriate.
4. Certain courses in other engineering disciplines may be suitable as breadth electives but students must consult with ECE advising before planning for such coursework and should also ensure that they satisfy the pre-requisites for such courses.

Advanced Electives

COURSE	CREDITS	COURSE TITLE
CPEN 411	4 cr.	Computer Architecture
CPEN 412	4 cr.	Microcomputer Systems Design
CPEN 421	4 cr.	Software Project Management
CPEN 422	4 cr.	Software Testing and Analysis
CPEN 431	4 cr.	Design of Distributed Software Applications
CPEN 432	4 cr.	Real-Time Systems Design
CPEN 441	4 cr.	Human Computer Interfaces
CPEN 442	4 cr.	Introduction to Computer Security
ELEC 402	4 cr.	Introduction to VLSI Systems

Notes:

1. Certain special topics courses (CPEN 400/ELEC 400 courses) may be permitted as advanced electives. Currently such courses are:
    1.1. CPEN 400A (Building Modern Web Applications);
    1.2. CPEN 400D (Deep Learning);
    1.3. CPEN 400P (Program Analysis and Reliability Engineering);
    1.4. ELEC 400M (Machine Learning Fundamentals for Engineers).

2. Given the curriculum changes that are in effect from September 2021, CPSC courses will no longer count as advanced electives. CPSC 320 is now a required course and one need not use a technical elective slot for this course. CPSC 300- and 400-level courses can be taken as technical electives.

Science Electives

The allowed science electives were chosen in such a way as to provide an introduction to the practice of the scientific method for science majors. If you plan to ask for a permission to replace one of the allowed science electives with another course, you need to prepare a one-page (500 word) explanation detailing why the course you propose will serve as an adequate introduction to scientific method for future scientists. Please also provide a detailed definition of what a scientific method entails.

- **ASTR:** 102, 200
- **ATSC:** 113
- **BIOL**: 111, 112, 121, 230, 345
    - Typically, any University level Biology course can be used as a Science elective.
- **CHEM**: 201, 250, 251, 260
- **EOSC**: 110, 112, 114, 210
- **FNH**: 200
- **GEOB**: 102, 103
- **PHYS**: 200, 250, 330, 333, 404

Technical Electives

Students can choose their technical electives from the following list of courses:

- **CPEN** 499 (3/6 credits)
- **CPEN** courses in the list of breadth and advanced electives
- **CPSC** 302, 303, 304, 311, 312, 314, 320, 322, 330, 340, 404, 406, 411, 420, 421, 422, 425, 426, 427, 430, 440, 444
- **ELEC** 300- and 400-level courses that are not already required
- **APSC** 440, 461
- **BMEG** 310
- **MATH** 303, 305, 307, 320, 321, 322, 323, 340, 341, 342, 344, 400, 401, 404, 405, 406, 418, 419, 420, 421, 422, 425, 426, 427, 437, 440, 441, 442, 443.
- **STAT** 305, 306, 321, 344, 404, 406, 443, 460, 461.

Notes:

1. Certain "topics" courses in CS may count towards technical electives but these are handled on a case-by-case basis.
2. Students are responsible for registration in courses offered by other departments. Many courses do not have spaces reserved for CPEN students.
3. Other courses — from other engineering departments — may be permitted on a case-by-case basis.
4. BMEG 310: 4 credits of Biology coursework may be used to satisfy the BMEG 245 pre-requisite. One can choose a Science elective as appropriate.

Complementary Studies Electives

Engineering students complete **9 credits of elective coursework** as part of their complementary studies requirement.

- 6 credits are chosen from the list of Humanities and Social Studies. (Typically, 3 of these 6 credits are completed in Year 1.)
- 3 credits should cover the Impact of Technology and Society.
- At most one language course can be used towards the complementary studies requirement.

More details regarding the complementary studies are maintained by Engineering Academic Services: https://academicservices.engineering.ubc.ca/degree-planning/course-planning/

Note that the following required courses for Computer Engineering students also fall into the Complementary Studies category:
- WRDS 150 (or equivalent);
- CPEN 281: Technical Communication;
- CPEN 481: Economic Analysis of Engineering Projects;
- APSC 450: Professional Practice.

Free Electives

Students in Computer Engineering should complete 6 credits of free electives (courses from across all campus units). These credits must be completed at the University level (no transfer credit for AP coursework or for other courses completed in high school apply).

Free credits are intended to allow students to explore a variety of disciplines. The primary restriction on the free electives is that at most 3 credits can be at the 100-level.

Only 3 credits of language courses can be applied towards the free electives requirement.

Co-op courses are non-academic credits and cannot be used towards the free electives requirement.