

Computer Engineering

Course Description

(Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

CEG 2400

Microcomputer Systems

Microcomputer system organization: bus architecture, signals and timing, memory systems. Input/output interfacing methods: polling, interrupt, direct memory access. Assembly language programming: addressing modes, data manipulation and control flow instructions, programme linkage, parameter passing, macros. Peripheral device interfacing and device driver development. Prerequisite: ERG 2020.

CEG 3150

Principles of System Software

Virtual machines. System supports for programme execution: micro-kernels, interrupts and synchronizations, interprocess communications, memory management, protection, portability, fault tolerance techniques and device drivers. Multi-processor system support. Prerequisite: CSC 2100 or 2520.

CEG 3420

Computer Design

Design of modern computer systems: performance evaluation, instruction sets, design of arithmetic logic units, datapath and control, pipelining, memory hierarchy, interfacing processors and peripherals, parallel processors. Prerequisite: ERG 2020. (Not for students who have taken CSC 3420.)

CEG 3430

Advanced Microprocessing Systems and Applications

Structure of modern microcomputer systems: advanced microprocessors, caching, multiprocessing, high speed system bus. Microprocessor systems development. Real time systems and applications. Multimedia device interfacing and data processing. Prerequisites: CEG 2400 and 3480. (Not for students who have taken CSC 3430 offered in 2001-02 and before.)

CEG 3470

Digital Circuits

This course examines the issues involved in designing and analysing digital circuits in CMOS technology. Topics include fabrication process, usage of SPICE, transfer characteristics, noise margin, loading effect, propagation delay, fanout analysis, transient current, power dissipation, bistable circuits and memories. A brief introduction to VLSI circuits is also included. Prerequisites: ERG 2020 and ELE 2110.

CEG 3480

Digital Systems Design

This course aims at introducing the knowledge of applying digital techniques to solve practical problems. System integration issues such as power supply distribution, system timing, clocking schemes will be introduced. Each student is required to carry out a project which involves the design and construction of digital machine-controllers, man-machines interfaces, signal processors, etc. Prerequisite: ERG 2020. (Not for students who have taken CSC 3480 offered in 2001-02 and before.)

CEG 3490

VLSI Design

This course teaches techniques in designing and analysing VLSI circuits. Topics include design rules, layout fundamentals, switch-level simulation, charge sharing, static and dynamic logics, propagation-delay estimates, power considerations, data-path organization, clocking schemes, synchronizers, asynchronous circuits, pads, systolic computation, silicon compiler, high-level synthesis, and hardware description languages. Students will design complete IC's using both simple hand-layout programmes and CAD tools. Prerequisite: CEG 3470.

CEG 4430

Distributed Systems and Networks

This course aims to present the fundamental concepts and techniques about the design and construction of distributed systems. Topics to be covered are: models of distributed systems, networking and internetworking, concurrency control and synchronization, distributed programming, distributed operating systems, case studies of networking software. Prerequisite: CSC 1110 or 1130.

CEG 5010

Reconfigurable Computing

3 U; 3 Lect. 1 Tut. 2 Lab.

This course is concerned with the design of reconfigurable computing systems using hardware description languages. Topics covered include field programmable gate array architectures (FPGA), computer arithmetic, high speed digital logic, interfacing and case studies. Emphasis will be on how to design high performance digital systems at the algorithmic, system and logic level. Each student is required to implement and test a digital design of moderate complexity. Prerequisite: CEG 3480.

CEG 5120

Sequential Machines and Automata Theory

Structure of sequential machines, linear sequential machines, state machine testing, information losslessness of finite automata, state-identification and fault-detection experiments, finite-state recognizers, sequential circuit retiming technique, synthesis for combinational and sequential circuits. Prerequisite: ELE 2120 or ERG 2020 or its equivalent.

CEG 5270

CAD for Physical Design of Digital Systems

This course aims to present the fundamental concepts and algorithms applied in design automation (CAD) of VLSI circuits. The scope will include various areas in physical design of digital systems, including circuit partitioning, FPGA technology mapping, floorplanning, placement, routing, compaction and interconnect optimization. Prerequisites: CSC 2100 and ERG 2020.

CEG 5330

Logic Synthesis and Testing

This introductory course aims at building fundamental background and practical techniques for digital logic design automation and hardware testing conscious design issues. Some academic (Berkeley ESPRESSO/SIS) and industry tools will be introduced. The topics range from the classic to recent techniques on representation, manipulation and optimization of Boolean logic, minimization/manipulation of 2-level Sum-of-Product (SOP) form, large multi-level Boolean network synthesis, technology mapping, delay analysis, sequential logic synthesis, state minimization, retiming resynthesis, verification, advanced applications using Ordered Binary Decision Diagrams (OBDD's), hardware fault testing, and notions of design for testability. Prerequisites: CSC 2100 and ERG 2020.

Study Scheme

Major Programme

Applicable to students admitted in 2000-01 and thereafter

Students are required to complete a minimum of 79 units of Major courses as follows:

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|------|--|----------|
| (i) | Required Courses:
ERG 1810, 2011, 2012, 2020, 2310, 2810, 4910#, 4920#,
CEG2400, 3150, 3420, 3430, 3470, 3480, 4430, CSC 1130,
1140, 2100, 3640, ELE 1110, 2110, 2860, ELT 1111 | 64 units |
| (ii) | Elective Courses:
Select any two of the following courses:
CEG 3490, 5010, ELE 4410#, IEG 4020#, 4160#, 4190#
And select at least one of the following courses:
CSC 2800, 3100, 3120, 3160, 3170, 3210, 3250, 3280, 4120,
4130, 5150, 5160, 5180, 5190, 5220, 5240, 5250, 5290,
5320, 5340, 5420, 5430, 5460, 5470, 5480, CEG 5120,
5270, 5330
Remaining 6 units from any courses offered by the Faculty
of Engineering | 15 units |

Total: 79 units

Recommended course pattern

Term 1	Units	Term 2	Units	Term 3	Units
General Education	3	General Education	3	General Education	3
Physical Education	1	Physical Education	1	CEG 3150	3
CSC 1130	3	CEG 2400	3	CEG 3470	3
ELE 1110	3	CSC 1140	1	CEG 3480	3
ERG 1810	1	CSC 2100	3	CSC 3640	3
ERG 2011	3	ELE 2110	3	ELT 1111	3
ERG 2020	3	ERG 2012	3		
	—	ERG 2810	1		
	17		—		—
			18		18
Term 4	Units	Term 5	Units	Term 6	Units
General Education	3	ERG 4910	4	ERG 4920	4
CEG 3420	3	Electives	12	Electives	9
CEG 3430	3				
CEG 4430	3				
ELE 2860	2				
ERG 2310	3				
	—		—		—
	17		16		13

SUMMARY

	Units
General Education	12
Physical Education	2
Major Required Courses	64
Major Electives	15
Free Electives	6
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Total	99

- Notes: 1. Major courses which are coded 3000 and above will be included in the calculation of the Major GPA for honours classification. Courses with “ # ” are to be included in the Major GPA as well.
2. Besides the Major courses mentioned in Note 1, the other ACE, CSC, ELE, ERG, IDE, IEG, INE and SEG courses coded 3000 and above taken by the students will also be included in the calculation of the Major GPA.
3. **Applicable to students admitted in 2000-01:**
Students who have obtained a grade of “B” and above in “English Language” (Syllabus B) in HKCEE* and in HKALE* AS “Use of English” can apply for exemption from ELT 1111. Students being granted exemption can reduce their Major programme requirement to 76 units, but they still have to fulfil the University’s requirement of completing at least 99 units of courses before graduation.

* *Only applicable to students admitted on the strength of HKALE results. The HKCEE and HKALE results to be deemed acceptable for course exemption purpose must be obtained in that particular sitting of HKCEE and HKALE which the University has used to assess the admission qualification of the student concerned.*