

Computer Science and Engineering

Majors: The Computer Science and Engineering ABEEK program:

- (1) Students in ABEEK must take a minimum of 81 credits from Computer Science and Engineering major courses.
- (2) MSC Subjects : STS2005, 2006
 PHY1101, 1102, 1001, 1002
 MAT2410, MAT2420
 6 cr. from MAT2010, 2110, 2120, 3020
 (a total of 26 cr.)
 (MSC will not be counted as CSE major credits.)
 Major required courses: CSE2003, 2035, 3006 3013, 3015, 3016, 3080, 4070, 4100 4152 4187 cse4186 cse4190 (a total of 36 cr.)
 Major courses: At least 45 credits are required. Must be included: four courses from cse3081 4010 4050 4110 4115 4175 4185(Note: These are not included as major required courses.)
- (3) Design courses: Students must take a minimum of 12 credits from the major credits in this department.

Course Completion Roadmap

Acad. Year	1st Semester	2nd Semester
1	HSS3014 1 COR1007 1 COR1001 3 COR1009 3 STS2005 3 PHY1001 3 PHY1101 1 CSE2003 3 <hr style="width: 100%;"/> Total 18	STS2006 3 PHY1002 3 PHY1102 1 COR1003 3 CSE2035 3 CSE3006 3 <hr style="width: 100%;"/> Total 16
2	Select 1 from: - ETS2001, - ETS2002 - ETS2003, - ETS2004 3 MAT2410 3 CSE3013 3 CSE3080 3 <hr style="width: 100%;"/> Total 12	Select 1 from: - HFS2001, - HFS2002 - HFS2003 3 MAT2420 3 CSE3015 3 CSE3016 3 <hr style="width: 100%;"/> Total 12
3	Select 1 from: SHS2001~2007 STS2010- 3 MAT Select ¹⁾ 3 CSE4100 3 <hr style="width: 100%;"/> Total 9	Select 1 from: SHS2001~2007 STS2010- 3 MAT Select ¹⁾ 3 CSE4070 3 CSE4152 3 <hr style="width: 100%;"/> Total 12
4	Select 1 from: CSE4186,CSE4190 3 <hr style="width: 100%;"/> 3	CSE4187 3 <hr style="width: 100%;"/> 3

Note: 1) MAT2010, MAT2110, MAT2120, MAT3020 (Select 2)

Undergraduate Curriculum

Majors : The General Computer Science and Engineering program:

- (1) Total credits:
 - Multiple majors: a minimum of 45 credits
 - Single major: a minimum of 60 credits
 - Teacher training program: a minimum of 60 credits
- (2) Prerequisites: MAT2410, 2420; PHY1101, 1001, 1002(a total of 13 cr.)
- (3) Required major courses: CSE3013, 3015, 3016, 3080, 4070(a total of 15 cr.)
- (4) The teacher-training program requires: CSE3981, 3982, 3983(a total of 9 cr.)
- (5) Students with a single major need a minimum of 39 credits and multiple majors need at least 30 credits from classes in this department in addition to the requirements in (2) and (3) above. Students in the teacher-training program need at least 27 credits.

Course Completion Roadmap

Acad. Year	1st Semester	2nd Semester
1	COR1001 2 COR1003 3 STS2005 3 PHY1101 1 PHY1001 3 <hr style="width: 100%;"/> 12	COR1002 2 COR1004 3 STS2006 3 PHY1002 3 <hr style="width: 100%;"/> 11
2	Select 1 from : 3 ETS2001 ETS2002 ETS2003 ETS2004 MAT2410 3 CSE3080 3 CSE3013 3 <hr style="width: 100%;"/> 12	Select 1 from : 3 HFS2001 HFS2002 HFS2003 HFS2004 HFS2005 MAT2420 3 CSE3015 3 CSE3016 3 <hr style="width: 100%;"/> 12
3	Select 1 from : 3 CHS2005 SHS2005 SHS2006 <hr style="width: 100%;"/> 3	CSE4070 3 <hr style="width: 100%;"/> 3
4		

**CSE1031 Statistical Information 3 cr.
Theory**

(lect.: 3hr, theory 3; Prereq.: STS2006)
 An introduction to basic probability and statistical theories for computer system modeling, performance evaluation, and analysis, including simulations of data analysis.

**CSE1032 Advanced Discrete 3 cr.
Structures**

(lect.: 3hr, theory 3; Prereq.: CSE1031)
 Advanced studies on discrete structures and an introduction to basic linear algebra.

**CSE2003 Introduction to 3 cr.
Engineering Design**

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(lect.: 3hr, design 3)

This course begins with a description and breakdown of an engineering problem, with an overview of the basic engineering techniques, basic concepts, and computer language programs needed to complete practical projects related to computer engineering.

CSE2007 Introduction to Combinatorics 3 cr.

(lect.: 3hr, theory 3)

Fundamental principles of combinatorics, basic counting principles, recursion, generating functions, and elementary combinatorial algorithms.

CSE2009 Introduction to Computer Science and Engineering 3 cr.

(lect.: 3hr, theory 3)

Introduction to computer system and computer science and Engineering, how to use computer systems.

CSE2035 C Language Programming 3 cr.

(lect.: 3hr, theory 2, design 1)

Introduction to programming in C, syntax, semantics, and structures of C, and problem solving with C in DOS & UNIX environments.

CSE3006 Discrete Structures 3 cr.

(lect.: 3hr, theory 3)

Fundamentals of algebraic structures, with applications to computer science and Engineering.

CSE3013 Computer Science and Engineering Laboratory I 3 cr.

(6hr. lab.: design 1, experiment-exercise 2; Prereq.: CSE2035)

Basic hardware structure of PCs, understanding MS-Windows, Hangul processing, documentation and program development tools under Windows, Windows programming, and an introduction to computer viruses.

CSE3015 Introduction to Digital Circuits 3 cr.

(lect.: 3hr, theory 3)

Introduction to Boolean algebra with switching theory, synthesis and analysis of combinational and sequential logic.

CSE3016 Computer Science and Engineering Laboratory II 3 cr.

(6hr. lab.: experiment-exercise 3)

Laboratory experiments pertaining to combinational and sequential circuits, basic logic components and flip-flops, MSI logics such as decoder, mux, adder and subtractor, counter, shift registers, ROM, PLA, and PLD devices.

CSE3030 Assembly Programming 3 cr.

(lect.: 3hr, theory 2, design 1)

Assembly language programming, instruction execution and compilation, and memory addressing and input/output processing.

CSE3040 JAVA Language Programming 3 cr.

(lect.: 3hr, theory 2, design 1)

JAVA programming: class, Windows programming, component, applet and Internet applications, thread, data structure in JAVA, application program including fractal.

CSE3080 Data Structures 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE2035)

Arrays, stacks, queues, linked lists, trees, graphs.

CSE3081 Design and Analysis of Algorithms 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE3080)

A survey of the correctness of iterative and recursive algorithms, methods used in designing efficient algorithms, dynamic programming, divide-and-conquer, and the greedy method.

Undergraduate Curriculum

CSE4010 Computer Organization and Logic I 3 cr.

(lect.: 3hr, theory 3; Prereq.: CSE3015)

An introduction to basic concepts of digital computers, including micro-operations among registers and control logic. Also, elementary features in digital systems are included.

CSE4011 Embedded Computer Structure 3 cr.

(lect.: 3hr, theory 3; Prereq.: CSE3015)

Machine organization at the register transfer level, data and control paths of CPUs, microprogrammed and hardwired implementation of the control unit, simple arithmetic units, memory systems and management, basic I/O organization.

CSE4050 Programming Languages 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE3080)

Syntax and semantics of programming languages, including general programming language constructs, abstract data types, implementation of programming language, as well as logic, functional, and object-oriented programming languages.

CSE4060 Introduction to Data Communication 3 cr.

(lect.: 3hr, theory 3)

Basic physical and mathematical concepts for data transmission, including transmission media, data encoding and decoding, and modulations; data link error and flow control; and multiplexing and switching methodologies. Also includes an introduction to computer network architecture.

CSE4061 Computer Science and Engineering Laboratory III 3 cr.

(6hr. lab.: experiment-exercise 3)

Laboratory experiments pertaining to the basic protocol for data communication, operations, and monitoring of the experimental network.

CSE4070 Operating Systems 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE3080)

Operating systems' principles, resource and file management, memory and processor management, dynamic protection and security, and network interface.

CSE4085 Automata Theory 3 cr.

(lect.: 3hr, theory 3)

Finite automata, regular expressions, Turing machines, computable functions, and surveys of other automata.

CSE4095 File Processing 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE3080)

Fundamental file processing operations and file organizations: storage devices, system software, sequential files, external sorting, indexed files, B-tree, multi-key processing, and spatial files.

CSE4100 Systems Programming 3 cr.

(lect.: 3hr, theory 1, design 2)

Algorithms and run-time structures of language processors such as assembler, macro processors, linkers and loaders. Also includes an introduction to program development environments and their implementation.

CSE4105 Software Design 3 cr.

(lect.: 3hr, design 3)

Structured design tools, module coupling, transaction division, structured analysis, system descriptive method, optimization and verification required in structured design.

CSE4110 Database System 3 cr.

(lect.: 3hr, theory 2, design 1)

Differences with file systems, characteristics of database systems, data models, architectures, relational systems, database design, data protections, and object-oriented systems.

CSE4112 Database Programming 3 cr.

(lect.: 3hr, theory 2, design 1)

Advanced database programming techniques for database design and development, with an emphasis on practical projects for applying

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the advanced techniques to real applications.

CSE4115 Software Engineering 3 cr.

(lect.: 3hr, theory 1, design 2; Prereq.: CSE2035)

Practical applications in software design and development: software cycle, problem analysis, requirements definition, specification and design, formal programming, testing and verification and methodologies.

CSE4116 Embedded System Software 3 cr.

(lect.: 3hr, theory 1, design 2)

Advanced system programming and embedded system-programming techniques for embedded system software: kernel programming in OS, techniques for device driver development, and system-call API based techniques.

CSE4120 Fundamentals of Compiler Construction 3 cr.

(lect.: 3hr, theory 1, design 2)

Compiler construction, syntax, lexical parsing, object code generation and optimization.

CSE4140 Numerical Computing and Applications 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: STS2006)

Floating-point number systems, numerical problems with floating-point arithmetic, stability of numerical computing, source-level and assembler-level code optimization, fixed-point arithmetic and programming on low-end processors, problem solving focusing on numerical applications, interpolation and approximation, numerical differentiation and integration, root finding, linear systems, and differential equations.

CSE4150 Introduction to Embedded System 3 cr.

(lect.: 3hr, theory 2, design 1)

Architecture and operation of a micro-processors, microprocessor instruction sets, assembly language programming examples, microcomputer memory design, input/

output operations, interrupt techniques, serial and parallel I/O, peripheral devices, microprocessors in analog environments, and floating point coprocessors.

CSE4152 Advanced Software Practices I 3 cr.

(6hr. lab.: design 1, experiment 3, exercise 2; Prereq.: CSE3013)

A practical introduction to methods for managing software development, with an emphasis on programming projects to enhance problem-solving capabilities.

CSE4155 Digital Systems 3 cr.

(lect.: 3hr, theory 2, design 1)

Multi-mini and multi-micro computer organization, communication, design, and application on characteristics of intercommunication digital processes.

CSE4158 Graph Theory and Algorithms 3 cr.

(lect.: 3hr, theory 3)

Fundamentals of graph theory, graph related problems and their algorithmic solutions with applications.

CSE4170 Introduction to Computer Graphics 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE2035)

Fundamental principles of computer graphics, overview of graphics software and hardware, geometrical transformations, viewing and projections, lighting and shading, geometric modeling, fundamental graphics algorithms, and photorealistic image synthesis.

CSE4175 Introduction to Computer Networks 3 cr.

(lect.: 3hr, theory 3)

Principles of computer networks: architecture, multi-layer protocols. packet switching and routing techniques, radio packets and medium access control, Local Area Networks, frame relay, cell relay, and B-ISDN/ATM.

CSE4176 Unix Programming 3 cr.

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(lect.: 3hr, theory 1, design 2; Prereq.: CSE2035)

The essentials of UNIX are covered with the use of high-level programming languages, utilities, and toolkits. Topics include UNIX shells, essential utilities and network security issues, high-level networking, and protocol basics. This course provides students with an opportunity to make the best use of UNIX.

CSE4177 Internet Programming 3 cr. and Applications

(lect.: 3hr, theory 1, design 2)

Internet principles, HTML programming, socket programming, the World Wide Web, CGI programming, and Java language and programming.

CSE4178 Basic SoC Design 3 cr.

(lect.: 3hr, theory 1, design 2; Prereq.: CSE3015s)

Introduction to SoC, design flows, the basic MOS transistor, resistance, capacitance, the MOS circuit, circuit design, layout, layout experiments, and advanced HDL programming. Also includes simple hardware design and experiments for understanding SoC.

CSE4179 Windows Programming 3 cr.

(lect.: 3hr, theory 2, design 1; Prereq.: CSE3080)

Windows programming using MS Visual C++: fundamentals in C++, graphics, menu, control, dialogue, and user interface applications.

CSE4181 SW Economic Analysis (lecture 3 hours : theory 3) 3 Credits

This course helps students who are majoring in engineering and will conduct R&D in S/W area improve the competitiveness of R&D by nurturing the accounting knowledge related to development business including SW economic analysis, cost and accounting related basic knowledge(basic finance analysis), R&D cost management,

targeting cost management and technological value evaluation. Students will learn SW area regarding the establishment and control of R&D budget, R&D assignment evaluation, taxation strategy in the startup of the company focusing on SW area and this course will cover the related contents in the form of study focusing on information user not the person in charge of accounting who produces the accounting information regarding basic accounting and cost accounting.

CSE4182 Design Pattern 3 cr.

(lect.: 3hr, theory 1, design 2)

Introduction to design patterns and refactoring methods: requirements engineering, software architecture pattern, UML, creational, structural, and behavioral patterns.

CSE4183 SW Specification Method (lecture 3 hours : Theory 3) 3 Credits

This course covers the method of specification by steps of SW development process to improve the re-usability. Students in this course study the standardized process of SW development and the phased activities of process and this course covers how the output to be written in each phase will impact on SW quality. In this course, students will study the specification of project proposal, risk assessment, work breakdown structure, high level design, low level design, S/W test plan, low level design, SW test plan, configuration management plan, installation guide, and user manual.

CSE4185 Introduction to Artificial Intelligence 3 cr.

(lect.: 3hr, theory 3; Prereq.: CSE3080)

Principle ideas and developments in artificial intelligence, including problem-solving methods, logic and theory, knowledge, natural language, image understanding, and algorithms for nonnumerical data processing.

CSE4185 Introduction to Artificial Intelligence 3 cr.

(lect.: 3hr, theory 3; Prereq.: CSE3080)

Principle ideas and developments in artificial intelligence, including problem-solving methods, logic and theory, knowledge, natural language, image understanding, and algorithms for nonnumerical data processing.

CSE4186 Capstone Design I (lecture 3 hours : theory 2) 3 Credits

Pre-requisite subject : CSE4100, 4152

This course has a goal of improving the ability to design in a more advanced way based on the theory and concept from math, basic science and profession liberal arts. This course trains students to solve the problem comprehensively in a unit of project by focusing on application development on the smart phone and organizing the team. In this course, students learn the environment setting and programming method required for programming on Android and iOS and conduct the team project focusing on their platform based on systematic development process.

CSE4187 Capstone Design II 3 cr.

(lect.: 3hr, design 3; Prereq.: CSE2003)

This course is a senior-level team project design course that requires the development of a market-oriented S/W product or solution to a real-world computer engineering problem. All projects follow steps in the NPI (New Product Introduction) process: project concept planning, project planning, and design verification.

CSE4188 Introduction to Cryptology 3 cr.

(lect.: 3hr, theory 3)

Deals with the mathematics that underlies modern cryptology. Topics include: classical cryptology, public and private key cryptosystems, secret sharing

schemes, authentication schemes, linear feedback shift registers, discrete logarithm and elliptic curve-based schemes.

CSE4190 Internship 1 cr.

An internship is a professionally oriented experience that provides a once in a lifetime opportunity for students to experience the working world while receiving guidance and feedback from their academic advocates. Very often an internship experience is the differentiating factor in a student's favor when applying for a job upon graduation.

CSE4199 Special Research 3 cr.

(lect.: 3hr, design 3)

In the final semester at the end of their undergraduate program, students should earn 3 credits from a research project in the area of computer science and engineering.

CSE4311 Theory of Interactive User Interface(lecture 3 hours : theory 3) 3 Credits

This course introduces interactive user interface design method focusing on acoustic model with HMM based regarding interactive user interface, language model based on the statistics, interactive user interface design method focusing on the search function realization. It introduces the method of audio finger print creation and search and music search, application by using it.

CSE4312 Data Mining (lecture 3 hours : theory 3) 3 Credits

This course introduces the concept of data mining deriving the knowledge from data, understand the concept of the mechanic study and algorithm to derive the knowledge and apply to various areas. The concrete themes are correlation analysis, decision making tree, Bayesian inference, support vector machine and clustering.

CSE4321 Human Language Technology

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Theory (lecture 3 hours : theory 3) 3 Credits

This course introduces how the language is processed and applied to various areas and covers the basic principles of Semantic information search technology and voice talk interface technology through morphological analysis and named entity analysis.

CSEQ981 Computerology Course Education

Theory(lecture 3 hours : theory 3) 3 Credits

This course considers various theories and views on the goal, contents, and evaluation of Computerology course education and analyzes concretely the practical course of Computerology education in the middle and high school.

CSEQ982 Study and Teaching Method of Computerology (lecture 3 hours : theory 3) 3 Credits

This course helps students improve the practical qualification to teach effectively the course of computerology course through the systematic analysis on course of computerology course and text books in the middle and high school and understanding of the theory and practice of computerology teaching method.

CSEQ983 Logics and Essay on Computerology Course (lecture 3 hours : theory 3) 3 Credits

This course helps students enhance the thought skill and ability to teach essay with the themes of the contents and principles of computerology based on the understanding of structure and nature of computerology course.