

Southwest University

Undergraduate Theory Course

Computing Essentials Syllabus

Computing Essentials Group

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Computing Essentials Syllabus

1. Course General Information

Course Code	625040114	Course Type	Discipline-based Courses (Required Course)
Chinese Name	计算机科学导论	English Name	Computing essentials
Suitable Specialty	Computer-related Specialty	Teaching Units	College of Computer and Information Science
Total Class Hours	54 (Theory: 36, Experiment Practice: 18)	Credits	3
Pre-Professional Programs	None	Follow-Up Courses	Advanced Programming, Data Structure

2. Course Nature, Position and Tasks

Computing Essentials is the computer-related professional basic course. This course teaches basic knowledge of computer, information code system in computer, basic elements in computer system, computer software, computer network, windows operating system, operation of office2000 office automation software and so on. It also provides the latest developments about computer area. By means of this course, make students be familiar with these crucial concepts and terms of computer software and hardware, system design, network application etc., master some basic operation and usage of some software, know basic hardware and devices, learn their characteristics of technology and usage, apply some basic network application skills. This course makes an effort to build the fairly comprehensive computer science architecture, knowledge framework and learning methods. On the basis of our course, students will know the actual problems computer can solve, strengthen their interest and understanding on the computer area. This course can lay the root for the in-depth study of the various professional courses; develop students' theoretical foundation and professional skills; bring up the adaptability of development of subject.

3 Basic Requirements of Course

3.1 Theory and Knowledge

Because this is the first professional course for freshman in the 1st semester, it is an important course of guiding students to enter the computer area. Pre-professional programs are not required. This course will roundly elaborate all fields of computer science from the past development, the current level and research directions of the present stage. By the learning of the course, students need know preliminary knowledge and crucial concepts, which build a computer knowledge

system for learner. Therefore, mastering the basic concepts and knowledge in theory is the chief task. Owing to the features of computer, the vivid and real samples are best tools of teaching; practice application implies much knowledge. Theoretical study should keep an eye on the combination of practice and demonstration, increase student' s interests; deepen the grasp of knowledge. There are many follow up courses, for example, *Advanced Programming* will utilize the information representation in our course to design the content of a program; *Principals and Application of Database* will discuss the design, search and optimization of database. Regarding teaching methods, the course should control the extent of teaching, use the knowledge points as the teaching units to relate the before and after courses.

3.2 Capability and Skills

The combination of practice and theory is the important characteristic. Except for the content of theory and knowledge, students also should apply the theory into our real world, have the application capability. Theory focuses on the introduction of computer hardware and software, operation system, computer network, information representation, programming stages and so on. Practice should pay attention to the abilities of typing, window basic operation, Word, Excel and PowerPoint. These abilities are the foundation of the further practice operations, such as later system development, program design, and system maintenance. As a result, Experiment is the indispensable part.

4 Assessment

- 1) **Assignments (10%): Students will be expected to complete the assignments related material presented in lectures and assigned reading.**
- 2) **Lab questions (30%): Students will be expected to complete lab assignments and the course design.**
- 3) **Final examination (60%): Students will be given one final exam.**

5 Course Content and Class Hours Distribution

Ch 1 Information Technology, the Internet, and You

1) Content

- Explain the five parts of an information system: people, procedures, software, hardware, and data
- Distinguish between system software and application software
- Distinguish between special-purpose and general-purpose application software
- Identify the four types of computers and the three types of microcomputers

- Describe the different types of computer hardware including the system unit, input, output, storage, and communication devices.
- Define data and describe document, worksheet, database, and presentation files.
- Explain computer connectivity and the wireless revolution.
- Describe the Internet and the Web.

2) Requirements

This is the beginning of our course. It outlines the overall knowledge, and every points talked about in the chapter will be discuss in the later chapter in detail. Students should be familiar with the basic computer terms and master the basic concepts. The key is grasping the system framework

- The basic parts of information system
- Distinguish system software from application software
- Types of computers and respective features
- System unit, memory, CPU, secondary storage
- Distinguish data from information
- Distinguish Internet from WWW

3) Keys

System software, types of computer, system unit

4) Difficulties

System software, system unit

5) Class Hours

3 class hours recommended

Ch 2 the Internet, Web, and Electronic Commerce Content

1) Content

- Discuss the origins of the Internet and Web.
- Describe how to access the Web using providers and browsers.
- Discuss Internet communications including e-mail, instant messaging, and discussion groups.
- Describe search tools including search engines, metasearch engines, and specialized search engines.
- Discuss electronic commerce including B2B, B2C, C2C, and security.

- Describe Web utilities: Telnet, FTP, plug-ins, and filters.

2) Requirements

This section is about Internet and its application. It is the part that current students can touch in real home. Real operation will strengthen the understanding.

- The basic parts of URL
- Email address
- Types of search engines and respective features
- EC and B2B, B2C, C2C
- Payment and respective advantages and disadvantages
- FTP, telnet, filter

3) Keys

URL, email address, Search Engine, Payment, Internet tools

4) Difficulties

URL, Search Engine

5) Class Hours

4 class hours recommended

Ch 3 Basic Application Software

1) Content

- Discuss common features of most software applications
- Discuss word processors & their features
- Describe spreadsheets & their features
- Discuss database management systems & their features
- Describe presentation graphics & their features
- Discuss integrated suites and software suites

2) Requirements

Practice is the key of this chapter. Related content will appear in our test. Word, Excel, PowerPoint are the basic OA software, which also are the main part of experiments. Demonstration and illustration are the important tools in the chapter.

- Word features and usage
- Excel features and usage
- Database concepts
- PowerPoint feature and usage
- OLE

3) Keys

Word, Excel, PowerPoint, OLE

4) Difficulties

Word, Excel, OLE

5) Class Hours

4 class hours recommended

Ch 4 Specialized Application Software

4) Content

- Describe graphics software including
 - Desktop publishing
 - Image editors
 - Illustration programs
 - Image galleries
 - Graphics suites
- Discuss audio and video software
- Describe multimedia, including story boards and multimedia authoring programs
- Explain Web authoring, Web site design, and Web authoring programs
- Describe the impact of artificial intelligence on emerging applications
- Discuss virtual reality and VRML
- Discuss knowledge-based (expert) systems
- Discuss robotics, including
 - Perception systems
 - Industrial robots
 - Mobile robots

5) Requirements

The software talked here is special area application software. So, introduction is the basic teaching method. Some important concept should be mastered, such as bitmap, vector picture and so on. Multimedia, network software, VR, IE can use demos, but students aren't required, just know.

- Distinguish bitmap from vector picture
- Audio and video file type
- Network concepts, flash
- VR and IE concept
- Expert system and fuzzy logic
- Robot

6) Keys

Bitmap, vector picture

7) Difficulties

VR, Expert system, fuzzy logic

8) Class Hours

4 class hours recommended

Ch 5 System Software

1) Content

- Describe the differences between system software and application software
- Discuss the four types of system software
- Discuss the basic functions, features and categories of operating systems
- Describe the Windows, Mac OS, UNIX, and Linux (operating systems)
- Describe the purpose of utilities and utility suites
- Identify the five most essential utilities
- Discuss Windows utility programs
- Describe device drivers including printer drivers

2) Requirements

This chapter talks about software in system. Some students can be familiar with Window

operating system, but be lack of further understanding. In this chapter, practical operation is used for window operation and utilities. Teaching is required in some key concepts, such as sector, driver.

- Distinguish the fours types of system software
- Distinguish the fours types of OS
- Distinguish the five utilities
- Windows utilities operations
- Sector and track
- Driver and its installment and update

3) **Keys**

System software, categories of operating systems, the five most essential utilities, window utilities, sector and track, device driver

4) **Difficulties**

Categories of operating systems, the five most essential utilities, sector and track, driver

5) **Class Hours**

4 class hours recommended

Ch 6 the System Unit

1) **Content**

- Describe the four basic types of system units.
- Discuss how a computer uses binary codes to represent data in electrical form.
- Describe each of the major system unit components.
- Describe system boards, microprocessors, and memory.
- Describe the function of the system clock, expansion slots, boards, and bus lines.
- Discuss ports, cables, and power supply.

2) **Requirements**

This chapter talks about hardware in computer system, especially system unit. Memory, mainboard, CPU, bus, port, power supply and expansion card are the keys of the chapter. In order to help students, demos and real objects are the important teaching tools.

- Distinguish the fours types of system units

- Binary code
- Mainboard, Memory, microprocessor, bus
- Expansion slots, expansion card
- Expansion bus, ports and power supply

3) Keys

Type of system units, binary code, motherboard, memory, bus, expansion slots and cards, ports and power supply

4) Difficulties

Socket & slot, CMOS & RAM & ROM & FLASH RAM, Cache, virtual memory, system bus & expansion bus, serial port & parallel port & USB port

5) Class Hours

3 class hours recommended

Ch 7 Input and Output

1) Content

- Define input.
- Describe keyboard entry, pointing devices, and scanning devices.
- Discuss image capturing devices, digitizing devices, and audio input devices.
- Define output.
- Describe monitors, printers, and audio output devices.
- Discuss combination input and output devices.

2) Requirements

This chapter talks about basic I/O devices computer system. It's easier in the course. In terms of the introduction of some devices, so demonstration and illustration are the best way of teaching.

- Layout of keyboard and features
- Types of mouse
- Scanner, OCR, MICR
- Resolution, refresh rate, size, color of Monitor
- LCD & CRT

- Resolution, color, memory of printer
- MFD
- IP telephone technology
- Four types of terminals

3) Keys

Layout of keyboard and features; Resolution, refresh rate, size, color of Monitor; LCD & CRT; Resolution, color, memory of printer; Four types of terminals

4) Difficulties

Resolution, refresh rate, size, color of Monitor;

Distinguish LCD from CRT;

Resolution, color, memory of printer;

Distinguish four types of terminals

5) Class Hours

4 class hours recommended

Ch 8 Secondary Storage

1) Content

- Distinguish between primary and secondary storage.
- Discuss the different types of storage media including floppy disks, hard disks, and optical disks.
- Describe the traditional floppy disk and compare it to high capacity floppy disks.
- Describe the following kinds of hard disks: internal hard disks, hard-disk cartridges, and hard-disk packs.
- Describe ways to improve hard-disk operations: disk caching, redundant arrays of inexpensive disks, data compression and decompression.
- Describe the different types of optical disks.
- Describe other kinds of secondary storage including solid state storage, Internet drives, and magnetic tape.

2) Requirements

Secondary Storage is the focus of this chapter. Floppy disk, hard disk, optical disk are the

keystones in the chapter. Because of usual devices that students can touch in their lives, demos and real object presentation are key means for teaching.

- Storage features and performance of hard disk, floppy disk, optical disk
- The structure of floppy disk
- Types of hard disk
- Methods of improvement of hard disk performance
- Principle of optical disk
- Formats of CD and DVD
- Solid storage features and advantages
- Sequential access and direct access

3) **Keys**

The structure of floppy disk

Hard disk hard-disk cartridges, hard-disk packs;

Disk caching, RAID, data compression and decompression;

Principle of optical disk

Formats of CD and DVD

Solid storage features and advantages

Sequential access and direct access

4) **Difficulties**

Hard disk hard-disk cartridges, hard-disk packs;

Disk caching, RAID, data compression and decompression;

Principle of optical disk

Sequential access and direct access

5) **Class Hours**

3 class hours recommended

Ch14 Programming and Languages

1) **Content**

- Describe the six steps of programming.

- Discuss design tools including top-down design, pseudocode, flowcharts, and logic structures.
- Describe program testing and the tools for finding and removing errors.
- Describe CASE tools and object-oriented software development.
- Explain the five generations of programming languages.

2) Requirements

The chapter gives the entrance to programming world. It doesn't pay close attention to the concrete programming language. In fact, programming design method is the center. Specification of Programming is focused on. Some basic concepts and knowledge should be mastered.

- the six steps of programming
- Top-down design, pseudocode, flowcharts, and logic structures.
- Program testing and the tools for finding and removing errors.
- CASE tools and object-oriented software development.
- five generations of programming languages

3) Keys

Top-down design, pseudocode, flowcharts, and logic structures

Logic error & syntax error

OOP, object and class

Difference and features of five generations of programming languages

4) Difficulties

Top-down design, pseudocode, flowcharts, and logic structures

OOP, object and class

5) Class Hours

4 class hours recommended

Ch (Plus) Number System

1) Content

- Basic features and concepts of decimal system, binary system, octal system, hexadecimal system.
- Methods of the conversion of different number systems
- Representation of float point integer and fraction

- Binary addition, subtraction, division, multiplication
- True code, complement code, radix minus one complement code

2) Requirements

This chapter is the foundation of many later courses. Be lack of this content in our textbook, it should be added. The chapter is difficult. Large numbers of calculation will appear here. Demonstration is indispensable

- Basic features and concepts of decimal system, binary system, octal system, hexadecimal system.
- Methods of the conversion of different number systems
- Representation of float point integer and fraction
- Binary addition, subtraction, division, multiplication
- True code, complement code, radix minus one complement code

3) Keys

Methods of the conversion of different number systems

Representation of float point integer and fraction

Binary addition, subtraction, division, multiplication

True code, complement code, radix minus one complement code

4) Difficulties

Methods of the conversion of different number systems

Representation of float point integer and fraction

True code, complement code, radix minus one complement code

5) Class Hours

3 class hours recommended