

Introduction

9/16/2009
Che-Rung Lee

The questions you will be asked

- The questions you will be asked for being a computer science/engineering major...
 - 太好了，你可以幫我修電腦嗎？
 - 我想要買電腦，你可以幫我...
 - 你有XX軟體嗎？
 - 幫我寫程式，好嗎？
- You may be able to do those things, but they are not what we will learn here.



What is computer science?

- Draws from other subjects, including
 - Mathematics
 - Engineering
 - Psychology
 - Physics
 - Social science
- The science of **algorithms**

What are algorithms?

- Let's talk about how to make cappuccino first.
- 材料：咖啡豆、牛奶、肉桂粉



- 用具：磨豆機、摩卡壺、牛奶發泡器



The Recipe

材料：咖啡豆、牛奶、肉桂粉或可可粉

Input

用具：磨豆機、摩卡壺、牛奶發泡器

Hardware

1. 將咖啡豆磨成粉，倒入摩卡壺杯內
2. 將摩卡壺下半部倒入水，上下套好，鎖緊壺身
3. 將咖啡壺置於瓦斯爐上煮沸，待熱水全部上升至上半部時離火，將咖啡倒進咖啡杯裡。
4. 在發泡器中倒入1/3壺鮮奶，加熱至60度C
5. 將濾網蓋放入發泡器中上下抽動約60次
6. 將發泡器底層之奶水倒入咖啡杯中約1/3杯，再刮入1/3杯奶泡，灑上可可粉或肉桂粉

Algorithm



Program

完成一杯卡布奇諾咖啡

Output

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What's the point?

- Making cappuccino and writing computer programs are just like to solving math problems

$$y = f(x) = 3x^2 + 2x + 5$$

Output Input Algorithm/program

– Use basic operations (+ – × ÷)

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Formal definitions

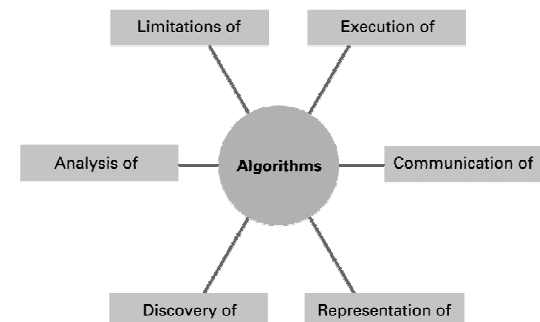
- **Algorithm:** A set of steps that defines how a task is performed
- **Program:** A representation of an algorithm
- **Programming:** The process of developing a program
- **Software:** Programs and algorithms
- **Hardware:** Equipment

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The central role of algorithms in computer science



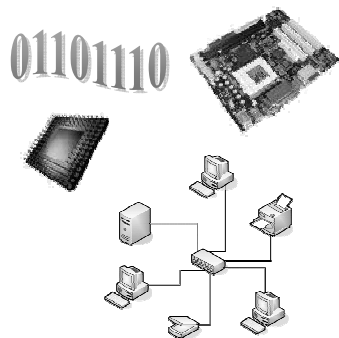
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What are we going to learn?

- Part I: How computers work.
 - Data representation,
 - Data manipulation,
 - Operating system,
 - Computer network

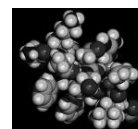


Data representation

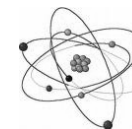
- The ingredients



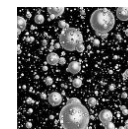
Ham



Molecule



Atom



Basic particles



Data



Files



Byte



Bit

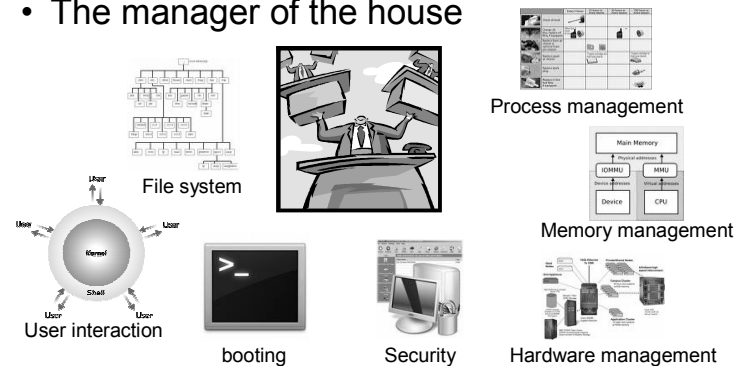
Data manipulation

- The tools



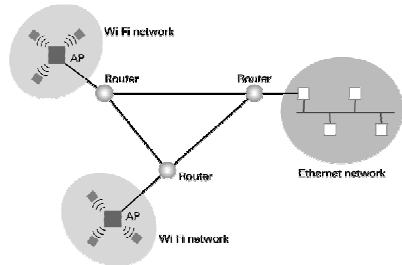
Operating system

- The manager of the house



Computer network

- The system that links computers and lets them communicate



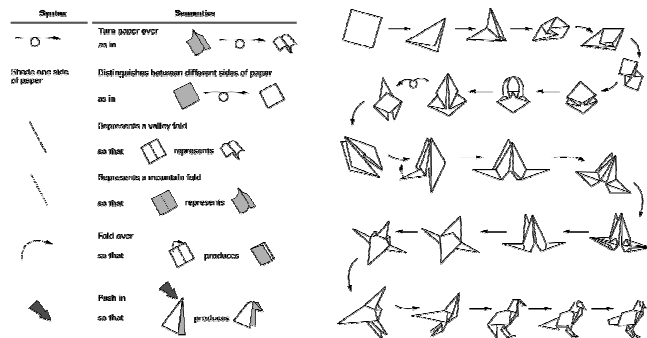
What else?

- Part II: How to make computers work.
 - Algorithm
 - Data structure
 - Programming language
 - System development and software engineering



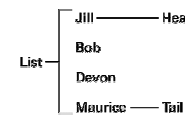
Algorithms

- The recipe to do everything on computers

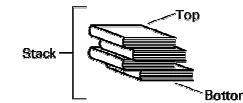


Data structure

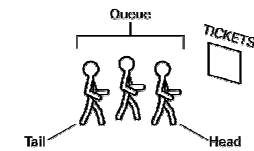
- The data arrangement that makes algorithms and programs efficient



a. A list of names



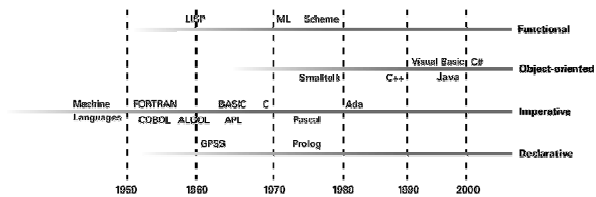
b. A stack of books



c. A queue of people

Programming language

- The spells to command computers



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Software engineering

- The principles of system development.



Analysis



Design



Implementation



Users input



Testing

Maintain

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We will also talk about

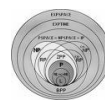
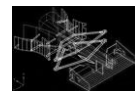
- Part III: What computers can/cannot do.
 - Database systems
 - Multimedia
 - Artificial intelligence
 - Computer aided design/scientific computing
 - Theory of computation



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Database

- The system appearing everywhere in our daily life.



Cashier system



ATM system



Phone bill



Parking violation bill



School's system

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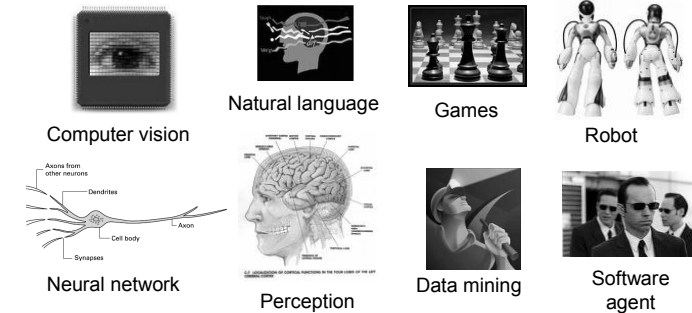
Multimedia

- Text, audio, images, animation, video, and computer games



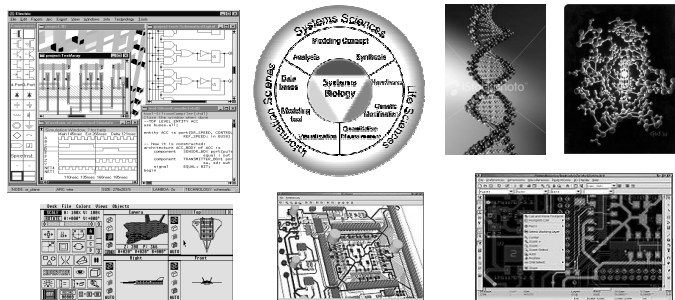
Artificial intelligence

- The study and design of intelligent agents



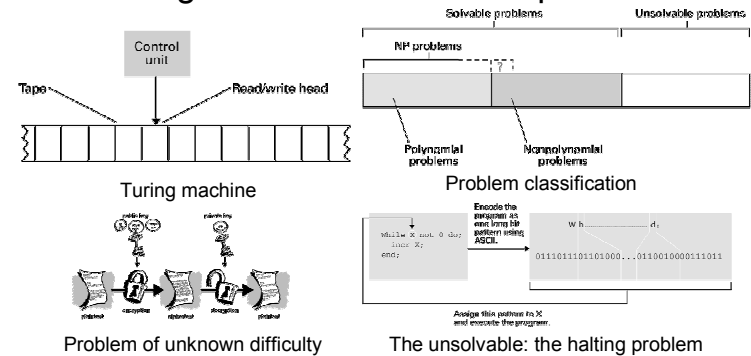
CAD / Scientific computing

- The tools aiding design and scientific discovery.



Theory of computation

- Knowing the limitations of computers.



The class map

- 必修課
- 系學程分類
 - 理論與演算法
 - 電腦網路
 - 系統軟體
 - IC設計
 - 多媒體與影像處理



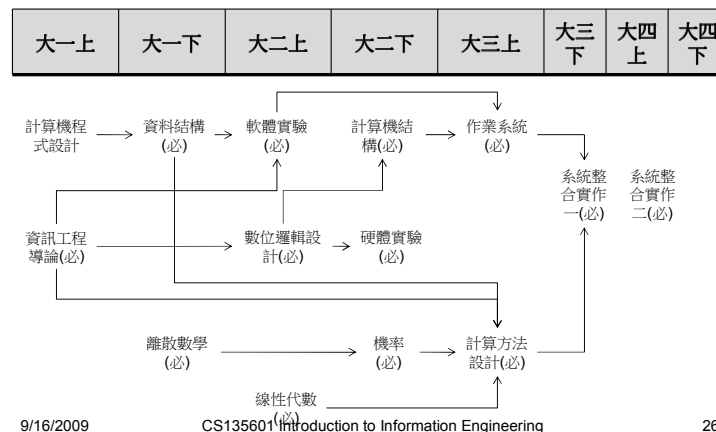
• Weblink <http://www.cs.nthu.edu.tw/nthucs/>

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必修課

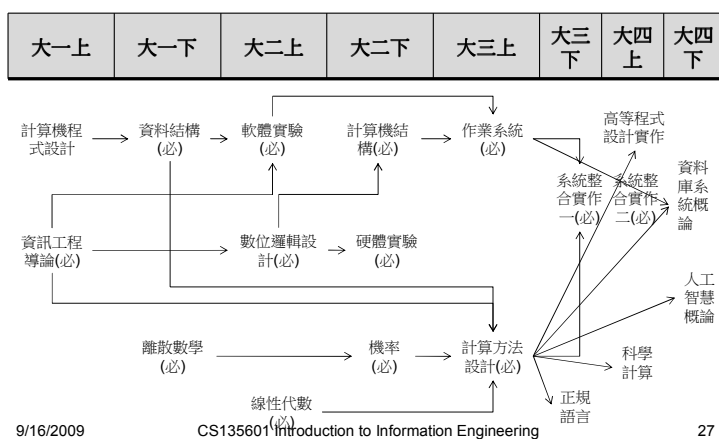


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理論與演算法

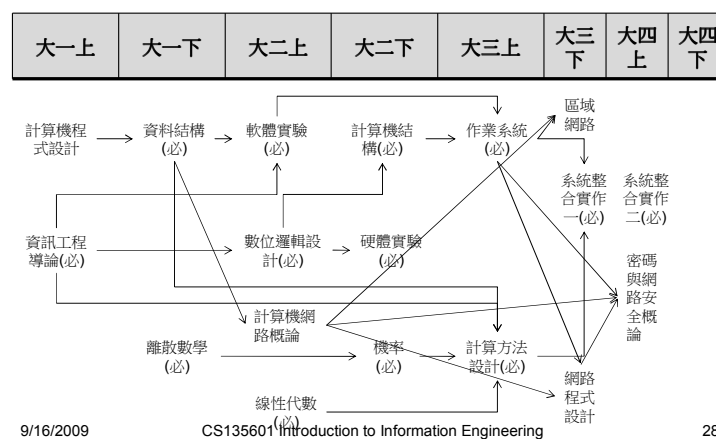


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電腦網路

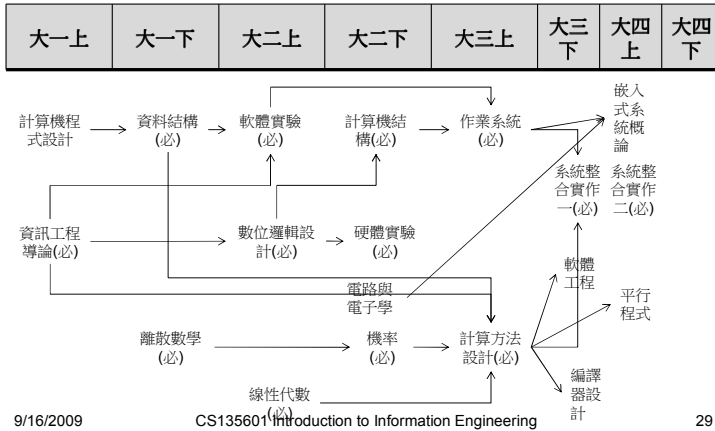


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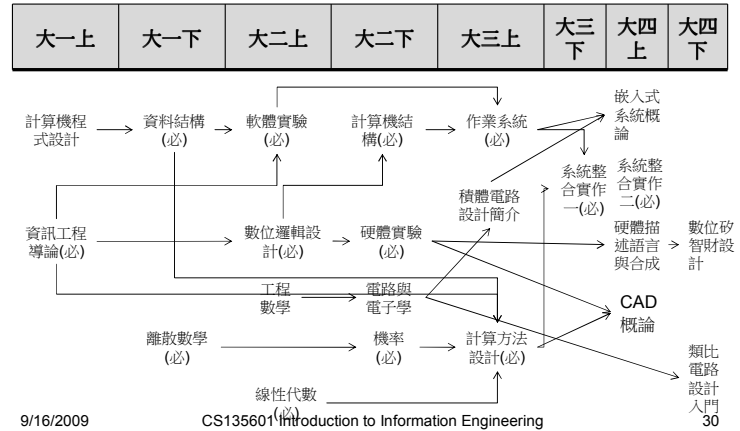
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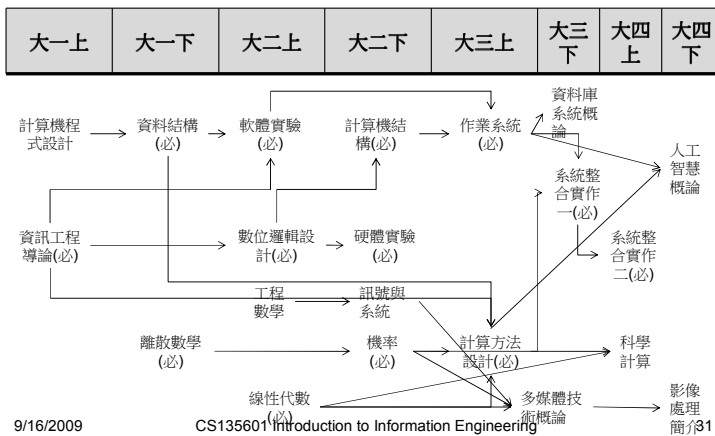
系統軟體



IC設計



多媒體與影像處理



Textbook and references

- *Computer Science: An Overview (10th ed)* by J. Glenn Brookshear
 - We will cover most part of chapter 1-4, and 6-8, and use other chapter as references.
- Many materials are obtained from the Internet and other books. A list of references will be given for each topic.

Relations to other courses

- There will be “related courses” for each topic
- Particularly, these two are strongly related to this course
 - 「資訊系統及應用導論」 teaches practical computer systems and applications
 - 「計算機程式設計」 teaches programming

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Slides

- The slides are only used as a teaching aid in class. You need to read the textbook.
- Slides will be put on website
 - <http://www.cs.nthu.edu.tw/~cherung/teaching/CS/>
 - I will also bring handouts to class
- Icon system in the slides
 - You need to know the concepts.
 - You must know the details.

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Course administration

- 授課老師: 李哲榮
 - 辦公室: 資電 744
 - email: cherung@cs.nthu.edu.tw
- 助教:
 - 陳易成 is0106@gmail.com
 - 王恩儷 hana_224@hotmail.com
- 上課時間: 星期一 10:10-12:00 星期三 9:00-9:50
- 上課地點: 資電館 131室
- 課程網頁:
<http://www.cs.nthu.edu.tw/~cherung/teaching/CS>

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Grading

- Assignments: 40%
 - There will be writing assignments and programming assignments.
- Exams: 50%
 - There will be 2 exams.
- Attendance: 10%

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Course problems

- Cannot make examinations
 - Tell us early and we will schedule makeup
- Cannot turn in homework on time
 - No late homework is accepted
- H1N1 threat
 - Do NOT come to class, but please inform me or TAs as soon as possible
- What is cheating?
 - Study together in groups is encouraged
 - Work must be your own