



计算机科学导论 (Introduction to Computer Science)

CS101 --课程大纲(Course Syllabus) -- Fall 2016

课程信息 (COURSE INFORMATION):

时间: Tuesday 12:55pm – 3:40pm

地点: 东上院 103 室

September 2016

week	S	M	T	W	T	F	S
					1	2	3
	4	5	6	7	8	9	10
(1)	11	12	13	14	15	16	17
(2)	18	19	20	21	22	23	24
(3)	25	26	27	28	29	30	

October 2016

week	S	M	T	W	T	F	S
(3)							1
(4)	2	3	4	5	6	7	8
(5)	9	10	11	12	13	14	15
(6)	16	17	18	19	20	21	22
(7)	23	24	25	26	27	28	29
	30	31					

November 2016

week	S	M	T	W	T	F	S
(8)			1	2	3	4	5
(9)	6	7	8	9	10	11	12
(10)	13	14	15	16	17	18	19
(11)	20	21	22	23	24	25	26
(12)	27	28	29	30			




December 2016

week	S	M	T	W	T	F	S
(12)					1	2	3
(13)	4	5	6	7	8	9	10
(14)	11	12	13	14	15	16	17
(15)	18	19	20	21	22	23	24
(16)	25	26	27	28	29	30	31

January 2017

week	S	M	T	W	T	F	S
(17)	1	2	3	4	5	6	7
(18)	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

Total: 18 weeks, 16 classes

-  Class Day
-  Holiday (1st, Oct/Jan)
-  Final Exam Week

讲师信息 (INSTRUCTOR INFORMATION):

姓名: 高晓汾 (Xiaofeng Gao)

办公室: 电信群楼 3-328 室

电话: 021-34207407

邮件: gao-xf@cs.sjtu.edu.cn

助教(TA): 陈智殷(Zhiyin Chen), Email: cknight@foxmail.com

储泉泉(Quanquan Chu), Email: spring_chu@sjtu.com

答疑时间: 每周二下午 16:00-18:00, 电信群楼 3-328 室 (以网页信息为主)

Office Hour: Check class webpage or by appointment



参考书目 (REFERENCE BOOK):

本课程以课堂笔记为主，辅以如下参考书目：

Lecture notes are the main materials used in this class, with the help of the following references:

- **计算机科学导论：**
 - **Foundations of Computer Science** (Second Edition), Behrouz Forouzan, Firouz Mosharraf, China Machine Press, 2013.
 - 《计算机导论》（第三版）黄国兴、陶树平、丁岳伟编著，清华大学出版社，2013。
 - 《计算机导论》（第二版）蔡平、王志强、李坚强编著，电子工业出版社，2014。
 - 《计算机导论》（第三版）宋斌、王玲、王平立编著，国防工业出版社，2013。
- **离散数学：**
 - **Discrete Mathematics and Its Applications** (6th Edition), Kenneth H. Rosen, McGraw-Hill Companies, 2007.
 - 《离散数学》，董晓蕾、曹珍富编著，机械工业出版社，2009。
- **数理逻辑与集合论：**
 - **Elements of Set Theory**, Herbert B. Enderton, ACADEMIC PRESS, 1977
 - **Notes on Set Theory** (Second Edition), Yiannis Moschovakis, Springer, 2005
 - **The Joy of Sets: Fundamentals of Contemporary Set Theory**, Keith Devlin, Springer-Verlag, 1993
 - 《集论与逻辑》，沈恩绍，科学出版社，2001
 - 《数理逻辑与集合论》（第二版），石纯一 王家 编著 清华大学出版社，2001.
- **图论：**
 - 《集论与逻辑》，沈恩绍，科学出版社，2001
 - 《图论与数据结构》，戴一奇等编著，清华大学出版社，1995；
 - 《图论》，王树禾，科学出版社，2008
- **数据结构：**《数据结构(C语言版)》，严蔚敏，吴伟民编著，清华大学出版社，1997。
- **算法：**
 - **Algorithm**, Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, Springer NY, 2006.
 - **Introduction to Algorithms**, T. Cormen, C. Leiserson, R. Rivest, C. Stein, The MIT Press, 2009.
- **自动机：Problem Solving in Automata, Languages, and Complexity**, Ding-Zhu Du, Ker-I Ko, John Wiley & Sons, Inc., 2001.
- **可计算理论：Computability: An Introduction to Recursive Function Theory**, Nigel L., Cutland, Cambridge University Press, 1980.
- **计算复杂性理论：Computational Complexity: A Modern Approach**, Sanjeev Arora and Boaz Barak, Cambridge University Press, 2009.



评分标准 (EVENTS AND GRADING):

- 本课程最后成绩的评定基于作业成绩、期末考试成绩、小组项目成绩、和平时成绩。
The final grade will be derived from your performance on the tests, projects, assignments, and class participations.
- 随堂作业: 每周一次, 第二周上课时提交, 共 12~14 次。
Assignment: Once per week. Please submit your answers at the next class. Totally 12~14 times.
- 期末考试: 第 16~17 周进行, 考全部授课内容。
Final: Week 16~17. Comprehensive test covering contents from Week 1 to Week 15 (Week 16).
- 小组项目: 3 人一组协作完成, 于课堂展示。
Group Project: 3 students form a group. Demo in class.
- 平时成绩: 分为考勤与课堂表现两部分。
Class Participation: evaluated by your attendance and actions.
- 分值比重: 各考核指标百分比分布如下表所示。
The percentage is shown as follows:

<u>Events:</u>		<u>Grading Policy:</u>	
Group Project	20%	90-100%	A
Final Exam	40%	80-89%	B
Assignments	35%	70-79%	C
Class Participation	5%	60-69%	D
Total	100%	59% and below	F

网页与资料 (WEBPAGE AND MATERIALS):

- 本课程所有课件、资料、公告等信息均可从课程网址下载参考:
<http://cs.sjtu.edu.cn/~gao-xf/Teaching/>
All the class materials (slides, references), homework assignments, announcements, and other information can be seen from <http://cs.sjtu.edu.cn/~gao-xf/Teaching/>
- 请定时查阅课程网页以获取最新信息。
Please check the webpage often to get the up-to-date information.

课堂章程 (INSTRUCTOR/COURSE POLICIES):

基本规范 (Common Sense Notices)

- 按时上下课, 请勿迟到早退。迟到 15 分钟以上视为缺课。
Please attend every class and do not be late. **15-minute** late attendance is considered absent.



- 上课期间请勿开启传呼机和手机等通讯工具（或调至静音）、请勿使用电脑。
Please turn off all cell phones, buzzers, and other noisy electronic devices during class time.
- 遵循基本课堂礼仪。
Please show common courtesy to your fellow classmates and professor.

作业提交 (Homework Submission)

- **迟交。** 请尽可能按时提交作业。截至时间之后提交的作业视为迟交。在截至日期之后三日内提交的作业扣 50%，不接收任何截至日期三日后的补交。不交作业零分。
Late assignments. Every effort should be made to hand in assignments by the due date and time. Late submission will deduce half grades. NO late submission is accepted after the three-day extension. Missed work will result in a grade of ZERO.
- **抄袭。** 请独立完成作业。任何抄袭现象将予以零分处理，情节严重者上报学院。
Academic dishonesty. Your work must be your own. Cheating will result in a grade of 0 for the applicable assignment; further disciplinary action may also be taken.
- **格式。** 作业是代表学习成果的正式展现，应规范作业格式。每次写作业时请注意：
Format. Assignments are your formal results of the class. Please pay attention to the following aspects when writing your assignments.
 - ① **新页。** 每次作业应另起一页。居中标题，注明作业次号与时间。
New Page. A new assignment should be written on a new page. Center the title and mark the assignment number and time.
 - ② **索引。** 作业标题下应标明本次作业题目号。每道题目答案前准确标号。根据作业题目不同应写“回答”或“证明”，证明结束应写结束符“□”。
Index. Summarize your question numbers after title. Label your answer in front. Write "Answer" or "Proof" at the beginning of your contents, and mark "□" at the end.
 - ③ **缩进。** 对列表、枚举、分析等内容进行缩进处理。
Indent. Give indents for lists, enumerations, and analysis etc.
 - ④ **留白。** 在页边留白，以便批注。
Margin. Keep margin for each page such that TA can easily give comments.

Example

Lab5-Reducibility

Name: Yang Fei September 4, 2012

Questions: P12. Q1(2,4,6,8), Q4(2,4,6), Q5(2,4,6,8), Q6(2). ← index

Q1(2) Suppose that A, B are r.e. sets such that $A \cup B = \mathbb{N}$ and $A \cap B \neq \emptyset$. Prove that $A \leq_m A \cap B$.

Proof. Let P_A be a program computing $x \in A$ and P_B be one that computes $x \in B$.

(a) Since $A \cup B = \mathbb{N}$, for any x , at least one of P_A and P_B will halt in finite steps. Moreover, since $A \cap B \neq \emptyset$, there is a number $x \in A \cap B$.

(b) Since $x \in A \Leftrightarrow \pi(x, 0) \in A \otimes \mathbb{N}$, $A \leq_m A \otimes \mathbb{N}$. Since $x \in A \otimes \mathbb{N} \Leftrightarrow \pi_1(x) \in A$, $A \otimes \mathbb{N} \leq_m A$.

Thus f is a total computable function by Church's Thesis. We have $A \leq_m A \cap B$. □



网络礼仪 (Email Netiquette)

- 课程电子邮件是师生正式交流渠道之一，应用正式邮箱。书写电子邮件应注意四点：
 - ① 准确书写你的邮件主题，包括课号和发信目的；
 - ② 请注明对方称谓；
 - ③ 撰写内容应遵照公文的格式规则，称呼对方使用“您”，结尾请用“致礼”等；
 - ④ 信件结尾处签名应包含姓名、所属班级、联系方式等信息。请设定电子签名。

请参考范例：

标题: [CS101]询问补交作业的问题 (5 班)

高老师：
您好。
由于上周生病我晚交了第三次《计算机科学导论》的作业，当时直接补给了助教。但本周发回作业并未看到我的本子，助教称已经全部发回，能否请您再帮忙查看一下是否遗漏在什么地方？谢谢。
致礼，

学生: 罗霄(Luo Xiao)
SID: 509030XXXX
Department of Computer Science and Engineering
Shanghai Jiao Tong University
Email: LuoXiao@gmail.com

- When you email me you should consider the email as official correspondence. As such, the email should not appear as a text message but should have proper grammar and punctuation. The email title should include: **Class ID/Your Purpose**. An example is below.

Title: [CS363] Question on Problem 3 of Lab2

Dear Prof. Gao,

I have some questions about the problem 3 in Lab2. In your solution you use a formula XXXX, but I use an alternative expression XXXX. Is this solution acceptable? Thank you.

--

Sincerely Yours,

Zhang Xinwen (张鑫文)
Department of Computer Science and Engineering
Shanghai Jiao Tong University
Email: zhenxw@gmail.com
Cell: 139*****245



计划日程(TENTATIVE SCHEDULE):

(日程可根据实际教学情况更改。The dates could be changed depending upon the pace of the course)

Week	Date	Lecture Topic	Event
1	Sep.13	School Opening	
2	Sep.20	Introduction to Computer Science Syllabus, Organization, Grading Policy, Introduction to Computer Science, etc.	Lab-01
3	Sep.27	Pseudo Code Programming Language, If, While, For, Case	Lab-02
4	Oct.04	National Holiday.	
5	Oct.11	Set, Function, and Relation Set, Function, Relation, etc.	Lab-03
6	Oct.18	Cardinality Definition, Natural Numbers, etc.	Lab-04
7	Oct.25	Cardinality Equinumerosity, Pigeonhole Principle, Cardinal Number, etc.	Lab-05
8	Nov.01	Proof Proof by Construction/Contrapositive/Cases/Induction	Lab-06
9	Nov.08	Logic Epistemic logic, Propositional logic, First Order Logic, etc	Lab-07
10	Nov.15	Data Structure List, Array, Stack, Queue, etc.	Lab-08
11	Nov.22	Graph Graph representation, Graph coloring, Graph isomorphism, etc	Lab-09
12	Nov.29	Path Path, Circuit, Euler and Hamilton Graph, etc.	Lab-10
13	Dec.06	Tree Tree, BFS, DFS, Huffman Tree, etc.	Lab-11
14	Dec.13	Tree (2) Minimum Spanning Tree, Kruskal Algorithm, Prim Algorithm, etc.	Lab-12
15	Dec.20	Algorithm (by John Hopcroft) Big-O, Sorting, Greedy, Divide-Conquer, Dynamic Programming	Lab-13
16	Dec.27	Computability (by John Hopcroft) Halting Problem, Turing Machine, Finite Automata	Lab-14
17	Jan.03	Complexity (by John Hopcroft) P, NP, NP-Complete, etc.	Lab-15
18	Jan.10	Randomness (by John Hopcroft) Random Walk, Probability, expected value, etc.	Lab-16
18	Jan.15	Final Exam	Final