课程详述

COURSE SPECIFICATION

　　以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

　　The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	分布与云计算 Distributed and Cloud Computing
2.	授课院系 Originating Department	计算机科学与工程系 Department of Computer Science and Engineering
3.	课程编号 Course Code	CS328
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	英文 English
8.	授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation& Contact （For team teaching, please list all instructors）	Georgios Theodoropoulos，讲席教授，计算机科学与工程系，georgios@sustech.edu.cn Georgios Theodoropoulos, Chair Professor, Department of Computer Science and Engineering, georgios@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment （Optional）	

11.	授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other（Please specify）	总学时 Total
	学时数	32		32		64

Credit Hours					

12.	先修课程、其它学习要求 **Pre-requisites or Other Academic Requirements**	CS102A 计算机程序设计基础 A Introduction to Computer Programming A CS305 计算机网络 Computer Networks
13.	后续课程、其它学习规划 **Courses for which this course is a pre-requisite**	无 None.
14.	其它要求修读本课程的学系 **Cross-listing Dept.**	

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教学大纲及教学日历 SYLLABUS

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15.　　教学目标 **Course Objectives**

This is an introductory course in the basic concepts, technologies and standards in the area of Distributed and Cloud Computing. It will cover important elements of distributed systems design such as system models and architectures, communication mechanisms, consensus algorithms, distributed objects and synchronization. The culmination in the development of distributed systems is Cloud Computing which is recognized as one of the top five emerging technologies that will have a major impact on the quality of science and society over the next 20 years. The course will provide an overview of this strategic field and will discuss the applications challenges and demands that drive developments, current cloud computing architectures and technologies and some existing industrial platforms.

The aims of this course are to:

- Provide an understanding of the fundamental problems, terminology, technologies, standards, architectures, protocols and models in Distributed Systems
- Provide an understanding of the applications challenges and demands that drive developments in cloud computing, and of the underlying architectures, technologies and service models.

16.　　预达学习成果 **Learning Outcomes**

On successful completion of this module, the student should be able to:

- Recognise and appreciate fundamental characteristics and issues of distributed systems such as timing, coordination and agreement.
- Explain the main types of architectures and mechanisms of communication, such as client-server, distributed object models and communication protocols.
- Design and develop distributed systems
- Understanding the basic concepts and technologies of cloud computing

17.　　课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

64 hours in total. 2 hours lecture and 2 hours lab for each week. Corresponding to the following sections：

LECTURES

- Week 1: **Characterisation of Distributed Systems 1.1 Introduction 2**
  - Trends in distributed systems
  - Challenges

- Week 2: **System Models**
  - Physical models
  - Architectural models
  - Fundamental models

- Week 3: **Interprocess Communication**
  - Networks and Internet Protocols
  - The API for the Internet protocols
  - Multicast communication
  - Overlay networks

- Weeks 4-5: **Distributed Objects and Remote Invocation**
  - Distributed objects
  - Request-reply protocols
  - Remote procedure call
  - Remote method invocation

- Weeks 6-7: **Indirect communications**
  - Group communication
  - Publish-subscribe systems
  - Message queues
  - Shared memory approaches

- Week 8: **Operating Systems**
  - The operating system layer and architecture
  - Processes and threads
  - Communication and invocation

- Weeks 9-10: **Time Global States**
  - Clocks, events and process states
  - Synchronizing physical clocks
  - Logical time and logical clocks
  - Global states

- Weeks 11-12: **Coordination and Agreement**
  - Distributed mutual exclusion
  - Elections
  - Coordination and agreement in group communication

- o Consensus and related problems
  - Week 13: **Cloud Computing Fundamental Principles and Architecture**
    - o The cloud reference model
    - o Types of clouds
    - o Open challenges
  - Week 14: **Cloud Virtualisation**
    - o Characteristics of virtualized environments
    - o Taxonomy of virtualization techniques
    - o Examples: Xen, VMware, Microsoft Hyper-V
  - Week 15: **Cloud Computing Advanced topics**
    - o Security
    - o Energy
    - o Economics
    - o Industrial platforms and new developments
  - Week 16: **Summary and Revision**

LABS

- Week 1: TUTORIAL. Familiarisation with the environment and a simple client-server system

- Weeks 2-4: LAB ASSIGNMENT 1. The design and implementation of register and login system using RMI

- Weeks 5-6: LAB ASSIGNMENT 2. The design and implementation of a Prototype RMI

- Weeks 7-8: LAB ASSIGNMENT 3. Bulk register simulator and optimisation of RMI

- Weeks 9-11: LAB ASSIGNMENT 4. Design and realize a publish-subscribe system

- Weeks 12-15: LAB ASSIGNMENT 5. Implementation of a SAAS administration system using SPRING.

- Week 16: Summary and Review.

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18. 教材及其它参考资料 **Textbook and Supplementary Readings**

- Distributed Systems, Concepts and Design, by George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Fifth Edition, Addison Wesley, ISBN 0-13-214301-1
- Mastering Cloud Computing: Foundations and Applications Programming, by Rajkumar Buyya Christian Vecchiola S.Thamarai Selvi, Morgan Kaufmann, ISBN: 9780124114548
- Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, and Geoffrey C. Fox, Morgan Kaufmann.

课程评估 **ASSESSMENT**

19. 评估形式   评估时间   占考试总成绩百分比 违纪处罚   备注

Type of Assessment	Time	% of final score	Penalty	Notes
出勤 Attendance		10%		Lab Attendance only
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		30%		Lab assignments. Detailed marking scheme provided to the students.
期中考试 Mid-Term Test				
期末考试 Final Exam		60%		Unseen exam
期末报告 Final Presentation				
其它（可根据需要改写以上评估方式）Others (The above may be modified as necessary)				

20.   记分方式 GRADING SYSTEM

☑ A. 十三级等级制 Letter Grading
☐ B. 二级记分制（通过/不通过）Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21.   本课程设置已经过以下责任人/委员会审议通过
    This Course has been approved by the following person or committee of authority