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	物联网工程基础 Internet of Things (IOT) Technology
2.	授课院系 Originating Department	电子与电气工程系 Electrical and Electronic Engineering
3.	课程编号 Course Code	EE344
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	中英双语 English & Chinese
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）	叶涛（教授），Rabi N Mahapatra （教授），电子与电气工程系，13266940594
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）	30

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	48				48

Credit Hours					

12.	先修课程、其它学习要求 **Pre-requisites or Other Academic Requirements**	EE202-17 数字电路 EE202-17 Digital Circuits
13.	后续课程、其它学习规划 **Courses for which this course is a pre-requisite**	无 NA
14.	其它要求修读本课程的学系 **Cross-listing Dept.**	无 NA

教学大纲及教学日历 SYLLABUS

15. 　**教学目标 Course Objectives**

The primary objective of the course is to make the students get introduced with Internet-of-Things (IoT), its architecture, components and various issues such as security, privacy, energy preservation etc. Through the course the students will also become aware of how various other important domains such as Computer Network Communication Protocols, Artificial Intelligence, Machine Learning, Data Analytics etc. are applied together to bring efficient collaboration among "Things" despite massive size and inherent heterogeneity issues in IoT.

本课程的主要目的是让学生对物联网的架构、组成以及与之相关的安全、隐私、能量供应等问题有基本的了解。通过教学，学生也将了解有关计算机网络通信协议、人工智能、机器学习、数据分析等领域在物联网方面的应用，以及他们是如何协同工作使得大量不同的物品能够进行有效的沟通和协作。

16. 　**预达学习成果 Learning Outcomes**

本课程目的是介绍有关物联网的基本概念。课程内容包含了物联网的最新技术和发展趋势。主要聚焦于物联网的平台、协议、不同属性以及一些应用示例。学生经过学习，将会预计掌握以下关于物联网的关键知识，包括，物联网操作系统，边缘计算以及云计算，物联网的网络协议，物联网的传感网协议，物联网安全和隐私问题，以及物联网的编程和分析方法。

The course aims to introduce the basic concepts underlying the Internet of Things (IoT). The topics are covered to understand the state-of-the-art and trends of the IoT. It will focus around IoT platforms, protocols, various attributes and a few case studies. The key topics that the students are expected to learn are: IoT Operating systems; Edge computing; cloud-computing, Networks and Protocols for IoT, Sensor networks for IoT, IoT Security and Privacy, along with programming and analysis skills for IoT systems.

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.)

Lecture 1.   Introduction: Introductions to IoT; (2hrs) 物联网介绍

Lecture 2. Various IoT systems and challenges; IoT trends; (2 hrs) 不同的物联网系统：挑战、趋势

Lecture 3.   IoT Architecture and Components: System architecture; hardware; (2 hrs) 物联网架构和组成：系统架构、硬件

Lecture 4: IoT Operating systems; (2 hrs) 物联网操作系统

Lecture 5: Sensors; scope of device drivers I; (2 hrs) 传感器与驱动设备 I

Lecture 6: Sensors; scope of device drivers II; (2 hrs) 传感器与驱动设备 II

Lecture 7: Edge computing; cloud-computing supports; (2 hrs) 边缘计算与云端支持

Lecture 8:   IoT Frameworks: ARTIK platform and usages; (2 hrs) 物联网框架：ARTIK 平台和应用

Lecture 9:   IoT Frameworks: IFTTT platform and usages (2 hrs) 物联网框架：IFTTT 平台和应用

 Lecture 10.   Networks and Protocols for IoT. (2 hrs) 物联网网络和协议

Lecture 11: Sensor networks for IoT, (2 hrs) 物联网与传感网络

Lecture 12: Energy conserving MAC and network layer protocols, device discovery protocols. (2 hrs) 能量采集接口及网络层协议，设备发现协议

Lecture 13.   Emerging attributes of IoT: Artificial intelligence for IoT; Cognitive IoT; multi-modal modelling; (2 hrs) 物联网新兴属性：人工智能、认知物联网与多模式建模

Lecture 14: programmability; tools and platforms; (2 hrs) 编程：工具与平台

Lecture 15:   IoT Data analytics: Understanding IoT data; IoT data collection and integration; (2 hrs) 物联网数据分析：理解、收集及集成

Lecture 16: Machine learning techniques for data analysis; (2 hrs) 机器学习数据分析

Lecture 17: Advanced analytics (2 hrs) 高级分析方法

Lecture 18: IoT analytics tools; (2 hrs)物联网分析工具

Lecture 19: IoT Security and Privacy: Authentications (2 hrs) 物联网安全与隐私：授权认证

Lecture 20: Biometric authentications; software / applications with dynamic authentication; (2 hrs)，生物识别认证，动态认证软件/应用

Lecture 21: Privacy along with security, Fluid media; privacy and security with VANET; (2 hrs) 安全与隐私，流媒体，VANET 安全隐私

Lecture 22: Case studies: IoT wearable and healthcare; industrial IoTs; (2 hrs) 范例：可穿戴物联网与健康，工业物联网

Lecture 23: Low-power considerations in IoT; (2 hrs) 范例：低功耗物联网

Lecture 24: Voice user interactions; (2 hrs) 范例：语音用户交互

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

1. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things" (1st Edition); by David Hanes et. al; Cisco Press, 2017; ISBN-10: 1587144565.

2. "Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security"; By Perry Lea, ISBN-10: 1788470591; Wiley Publication, 2018.

3. Additional course materials are extracted from various research articles published in ACM and IEEE journals/conferences and technical reports on the topics described in the course description. The instructor will provide references to the course materials online.

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance		5		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		20		
期中考试 Mid-Term Test		25		
期末考试 Final Exam		35		
期末报告 Final Presentation		15		

其它（可根据需要改写以上评估方式） **Others (The above may be modified as necessary)**		5		

20. 记分方式 GRADING SYSTEM

- ▪ A. 十三级等级制 **Letter 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