

## DS204 课程大纲

- 1、2022 秋季学期 (2-7 页码)
- 2、2023 秋季学期起 (8-12 页码)

## 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 <b>Course Title</b>	交互式系统设计 <b>Responsive Systems</b>
2.	授课院系 <b>Originating Department</b>	创新创意设计学院 School of Design
3.	课程编号 <b>Course Code</b>	DS204
4.	课程学分 <b>Credit Value</b>	3
5.	课程类别 <b>Course Type</b>	专业基础课 Major Foundational Courses
6.	授课学期 <b>Semester</b>	秋季 Fall
7.	授课语言 <b>Teaching Language</b>	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) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	LUO Tao Assistant Professor, School of Design neoluotao@163.com

9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	无 NA				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	32		32		64
12.	先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b>	无 N/A				
13.	后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b>	无 N/A				
14.	其它要求修读本课程的学系 <b>Cross-listing Dept.</b>	无 N/A				

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

本课程邀请学生设计并制作（实体的或虚拟的）交互式对象，利用各种属性（按钮，位置，压力，光、声等）和控制逻辑来对人的行为做出动态的响应。目标是通过仔细关注人们在生理、认知和情感上的需求，建立特定场景中对人们有意义的、新颖的、数字化的关系。此类交互式对象的可能应用领域包括：环境控制、协作环境、游戏、动手学习、以及非标准/专用人机界面的使用。本课程的大部分课堂时间将用于开发数字编码、制作和原型制作技能。

核心技能：电子控制系统、系统组装、对交互属性的理解、数字编码（控制逻辑）、团队合作

This course invites students to design and prototype (physical or virtual) objects that respond dynamically to human interaction through various properties (button, position, pressure, light, sound, etc.) and control logic. The goal is to engage people in meaningful and novel digitally-mediated relationships in a certain context, paying careful attention to physiological, cognitive and emotional human needs. Possible application areas for such objects include environmental

control, collaborative environments, gameplay, hands-on learning and the use of non-standard/special-purpose human computer interfaces. A significant portion of the contact time in this class will be dedicated to the development of digital coding, making and prototyping skills.

Skills: electronic control systems, system assembly, understanding of properties in Interaction, digital coding (control logic), teamwork

## 16. 预达学习成果 Learning Outcomes

通过学习，学生将能够：

- 分析和说明交互式系统的使用场景、需求
- 制作交互式系统的硬件和软件原型。原型工具：Arduino、Origami Studio\*
- 测试原型并根据测试结果进行改良

(\*若本课程开始时教室中的 iMac 已安置好)

By the end of this course, students will be able to:

- Analyze and illustrate use scenarios for responsive systems
- Prototype responsive system hardware and software. Tools: Arduino, Origami Studio\*
- Test the prototype and refine it based on test results

(\*If iMacs in classroom are prepared when the course begins)

## 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.).**

<b>Week</b>	<b>Content</b>
1	<p>Welcome, Introduction, and Expected Mindset</p> <p>Introduction: HCI, Case Studies &amp; Human Needs, Prototyping</p> <p>Physical Computing, Digital &amp; Analog, Properties &amp; Control</p> <p>Case Studies (Demo), Identifying Project Opportunities</p> <hr/> <p>Arduino and Origami Introduction and Setup</p> <p>Electronic Components and Circuit Prototyping</p> <p><i>Practice 1 (support and tutorials)</i></p> <p>Storytelling and Scenario Building</p>
	<p>Properties in Interaction, Coding: Data I/O</p> <p>Coding: Sensors</p> <p>Coding: Motors, Actuators, Animations</p> <p><i>Practice 2 (support and tutorials)</i></p> <hr/> <p>Properties in Interaction (Details), Coding: Data Type</p> <p><i>Practice 3 (support and tutorials)</i></p> <p>Detailed Analysis of Human Need (Cases)</p>
2	<p>Control Logic &amp; Relationship in Interaction</p> <p>Coding: Control Structures</p> <p><i>Practice 4 (support and tutorials)</i></p> <hr/> <p>Coding: Libraries (Arduino/Origami)</p> <p><i>Practice 5: (develop ideas and select functions or patches to explore)</i></p>
	<p>Coding: Libraries (Arduino/Origami)</p> <p>Time as a Property in Interaction (Speed, Lag, Delay, Constraint, etc.)</p> <p><i>Practice 6 (support and tutorials)</i></p> <hr/> <p><i>Project Development (support and tutorials)</i></p> <p><i>Interim Presentation &amp; Review, Acting, Perceiving and Understanding (guest judge)</i></p> <p><i>Mutual Comments</i></p>
3	<p>Coding: Libraries (Arduino/Origami)</p> <p>User Test and Iteration</p> <p><i>Project Development (support and tutorials)</i></p> <hr/> <p>Personal Industry Experience, Cases &amp; Lessons</p> <p><i>Industry Visit. (candidates: Tencent, OPPO, NetEase Games, CVTE, etc.)</i></p>
	<p>Supplementary Theory Lecture, Q&amp;A</p> <p><i>Project Development (support and tutorials)</i></p> <hr/> <p><i>Project Development (support and tutorials)</i></p>
4	<p>Supplementary Theory Lecture, Q&amp;A</p> <p><i>Project Development (support and tutorials)</i></p> <hr/> <p><i>Project Development (support and tutorials)</i></p>
	<p>Supplementary Theory Lecture, Q&amp;A</p> <p><i>Project Development (support and tutorials)</i></p> <hr/> <p><i>Final Presentation, Prototype Demonstration and Review (together with guest judges),</i></p> <p><i>Report Briefing</i></p>

	Summary and Conclusion Q&A, Course Feedback
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**18. 教材及其它参考资料 Textbook and Supplementary Readings**

- Jody Culkin and Eric Hagan (2017). *Learn Electronics with Arduino: An Illustrated Beginner's Guide to Physical Computing*, Maker Media, San Francisco, CA.
- Tianhong Pan and Yi Zhu (2017). *Designing Embedded Systems with Arduino: A Fundamental Technology for Makers*, Springer, Singapore.
- *Origami Studio 3 Online Tutorials* (<https://origami.design/tutorials/>)
- *Origami Studio 3 Online Documentation* (<https://origami.design/documentation/>)

**课程评估 ASSESSMENT**

19. 评估形式 Type Assessment	评估时间 of Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10%		

课堂表现 <b>Class Performance</b>				
小测验 <b>Quiz</b>				
课程项目 <b>Projects</b>				
平时作业 <b>Assignments</b>		20%		
期中考试 <b>Mid-Term Test</b>				
期末考试 <b>Final Exam</b>				
期末报告 <b>Final Presentation</b>		50%		
其它（可根据需要 改写以上评估方式） <b>Others (The above may be modified as necessary)</b>		20%		Interim Presentation
其它（可根据需要 改写以上评估方式） <b>Others (The above may be modified as necessary)</b>				

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**

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9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	无 NA				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
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核心技能：电子控制系统、系统组装、对交互属性的理解、数字编码（控制逻辑）、团队合作

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**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.)**

<b>Week</b>	<b>Content</b>
1	<b>Welcome and Introduction; Overview of Course:</b> Welcoming the students, laying out the syllabus and expectations, setting up the ground rules and academic expectations, and providing an overview of the course content.
2	<b>Exploring Resistors, Networks, and Measurements:</b> Detailed introduction to electrical components like resistors, their role in circuits, understanding networks, and learning to measure various quantities using instruments.
3	<b>Delving Deeper into Analog Electronics:</b> Further exploration of analog electronic components and circuits, capacitors, inductors, op-amps, and their practical applications.
4	<b>Getting Acquainted with Microcontrollers (MCU) - Arduino etc.:</b> An introduction to microcontrollers using popular platforms like Arduino, understanding their structure, operation, and use in various applications.

5	<b>Unveiling the World of Transistors:</b> Detailed study of transistors, their working principles, and their role in both analog and digital electronics.
6	<b>Beginning Journey with Programming in C++:</b> Introduction to C++ programming language, learning basic syntax, variables, data types, loops, and conditional statements.
7	<b>Diving into Functions, Arrays, Structs, and Memory Allocation in C++:</b> Deep dive into more complex concepts of C++, such as functions, arrays, structures, pointers, and dynamic memory management.
8	<b>Mid-Term Design Review and Critique</b>
9	<b>Establishing Software Communication with MCU and Processing, and other Protocols:</b> Learning to establish communication between software and hardware, using Arduino, Processing, and familiarizing with other communication protocols.
10	<b>Introduction to Sensors and Their Applications:</b> Understanding various types of sensors, their working principles, and how they can be interfaced with MCUs.
11	<b>Mastering MCU Advanced Usage: Timers, Ports, etc.:</b> Advanced concepts of using MCUs include timers, ports, interrupts, and more.
12	<b>Entering the World of Digital Electronics with Integrated Circuits (ICs):</b> Introduction to digital electronics, understanding logic gates, flip-flops, and using ICs to build digital systems.
13	<b>PCB Design: Transforming Ideas into Reality:</b> Introduction to PCB design using Eagle software, from schematic design to board layout, and final production.
14	Project tutorials 1: Practical project work with step-by-step guidance, and application of concepts learned so far.
15	Project tutorials 2: Practical project work with step-by-step guidance, and application of concepts learned so far.
16	<b>Final Design Review and Critique</b> Summary and conclusion; questions and answers; course feedback

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

<ul style="list-style-type: none"> <li>Jody Culkin and Eric Hagan (2017). <i>Learn Electronics with Arduino: An Illustrated Beginner's Guide to Physical Computing</i>, Maker Media, San Francisco, CA.</li> <li>Tianhong Pan and Yi Zhu (2017). <i>Designing Embedded Systems with Arduino: A Fundamental Technology for Makers</i>, Springer, Singapore.</li> </ul>
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Type	of Time	% of final	Penalty	Notes
Assessment		score		

出勤 Attendance		10%		
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		40%		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		50%		
其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				
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

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