

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	图像与视频处理 Image and Video Processing				
2.	授课院系 Originating Department	电子与电气工程系 Department of Electronic and Electrical Engineering				
3.	课程编号 Course Code	EE429				
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	秋季 Fall				
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)	时红建 Hongjian Shi 电子与电气工程系 Electrical and Electronic Engineering shihj@sustech.edu.cn				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	无 NA / 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 Credit Hours	32		32		64

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA103A 线性代数 I-A MA212 概率与数理统计 MA103A Linear Algebra I-A MA212 Probability and Statistics
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	计算机视觉，视频压缩与传输
14. 其它要求修读本课程的学系 Cross-listing Dept.	MA103A 线性代数 I-A MA212 概率与数理统计 MA103A Linear Algebra I-A MA212 Probability and Statistics

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

<p>课程学习目标：到课程结束，学生能做如下：</p> <ul style="list-style-type: none"> • 掌握基本图像与视频处理运算 • 掌握各种图像与视频分割方法及其医学影像应用 • 对图像与视频中的物体识别与信息进行有效提取 • 理解视频基本结构并能对视频进行处理，掌握编码与解码技能 • 掌握图像压缩原理及其后续处理 <p>Course Learning Objectives: By the end of this class, students would:</p> <ul style="list-style-type: none"> • Master the basic operations of image and video processing • Master various image segmentation methods and their application in medical imaging • Recognize the objects in image and video and extract useful information • Understand the basic structure of videos, and process, encode and decode videos • Master the principle of video compression and video post processing
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16. 预达学习成果 Learning Outcomes

<ul style="list-style-type: none"> • 掌握基本图像与视频处理运算 • 掌握各种图像与视频分割方法及其医学影像应用 • 对图像与视频中的物体识别与信息进行有效提取 • 理解视频基本结构并能对视频进行处理，掌握编码与解码技能 • 掌握图像压缩原理及其后续处理 • 应用图像视频处理技能到各种涉及图像与视频的场景，例如做图像视频增强、去噪、图像视频扩展等 <ul style="list-style-type: none"> • Master the basic operations of image and video processing • Master various image segmentation methods and their application in medical imaging • Recognize the objects in image and video and extract useful information • Understand the basic structure of videos, and process, encode and decode videos • Master the principle of video compression and video post processing • Apply image and video techniques to various scenarios such as image video enhancement, noise reduction, and image and video expansion etc.

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.)

教学大纲（内容会有少许变动，但基本内容不变）：
周

1. 图像与视频介绍	1
2. 图像处理的基本运算.....	2-4
3. 形态图像处理.....	5
4. 彩色图像的合成与处理.....	6
5. 图像分割及其医学影像应用.....	7-9
6. 人类视觉系统与图像感知.....	10
7. 视频结构与标准.....	11
8. 无损图像与视频压缩.....	12
9. 有损图像与视频压缩与后处理.....	13-14
10. 视频的编码与解码.....	15-16

SYLLABUS- COURSE OUTLINE(MAY BE MODIFIED SLIGHTLY)		WEEK
1. INTRODUCTION TO IMAGE AND VIDEO		1
2. BASIC OPERATIONS IN IMAGE PROCESSING.....		2-4
3. IMAGE MORPHOLOGICAL PROCESSING.....		5
4. COLOR IMAGE SYNTHESIS AND PROCESSING.....		6
5. IMAGE SEGMENTATION AND THEIR APPLICATIONS IN MEDICAL IMAGING.....		7-9
6. HUMAN VIDUAL SYSTEM AND PERCEPTION.....		10
7. VIDEO STRUCTURE AND STANDARDS.....		11
8. LOSSLESS IMAGE AND VIDEO COMPRESSION.....		12
9. IMAGE AND VIDEO COMPRESSION AND POST PROCESSING.....		13-14
10. VIDEO ENCODING AND DECODING.....		15-16

实验课内容：

小时数 32

实验课内容将结合讲课内容进行相应针对性的课堂计算机模拟实验，每章将有 1 到 3 个实验课课堂练习，整个课程有 3 到 4 个大的课后实验项目。内容不再一一列出。课程使用编程语言为 Visual Studios C++，OpenGL/OpenCV

Laboratory Course Content:

Laboratory course content will mainly be computer implementation pointed to the lecture stuff. There are about 1 to 3 class laboratory exercises. There are 3 to 4 big off class projects. The content will not list one by one. The programming languages are Visual Studios C++, OpenGL/OpenCV

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

- 1) A. C. Bovik, Handbook of Image and Video Processing, Academic Press, Second Edition, 2005.
- 2) R. C. Gonzalez and R. E. Woods, Digital Image Processing, third edition, 2008

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		-5 至 0% -5 to 0%	缺课一次减 1 分，迟到或早退减 0.5 分 1% credits off for one absence, and 0.5% for early or late attendance	

课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects	10 至 12 个课堂项目 10 to 12 class projects 1 个课程项目 1 course project	40 25	项目 60%通过为 课程通过必须 60% of projects is required for the course pass	
平时作业 Assignments	12 次作业 12 assignments	30		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		5		
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