

数字媒体技术

一、培养目标

依据“工程教育认证标准”制定培养方案，培养学生具有良好的人文、科学及工程素养，系统掌握计算机、软件工程领域的数理基础，具备科学研究能力；具有坚实的数字媒体技术专业理论知识、良好的科学思维方法和系统的工程实践技术，具备工程创新能力；能够综合运用学科基础知识与工程技术解决复杂工程问题，了解工程项目实施流程与多学科合作方式，具备项目管理能力；至少熟练掌握一门外语，了解数字媒体技术相关领域的国际发展前沿，具备国际视野与合作能力。

二、基本规格要求

数字媒体技术专业本科毕业生应达到如下素养和能力：

1. 工程知识：能够将数学、自然科学、工程基础和数字媒体技术专业知用于解决数字媒体技术领域的复杂工程问题。
2. 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达并通过文献研究分析数字媒体技术领域的复杂工程问题，以获得有效结论。
3. 设计/开发解决方案：能够设计针对数字媒体系统复杂工程问题的解决方案，设计满足特定需求的系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。
4. 研究：能够基于科学原理并采用科学方法对数字媒体技术领域的复杂工程问题进行研究，包括设计实验、分析与解释数据，并通过信息综合得到合理有效的结论。
5. 使用现代工具：能够针对数字媒体技术领域的复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。
6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价数字媒体技术专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。
7. 环境和可持续发展：能够理解和评价针对数字媒体工程实践对环境、社会可持续发展的影响。
8. 职业规范：具有人文社会科学素养、社会责任感，能够在数字媒体系统工程实践中理解并遵守工程职业道德和规范，履行责任。
9. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。
10. 沟通：能够就数字媒体系统复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。
11. 项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。
12. 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

三、培养特色

本专业在教育部本科专业目录中属于计算机类专业，培养方案以计算机类专业工程教育认证标准要求为准则，结合本校实际制定；专业的基础是计算机应用技术和领域软件工程，面向计算机与互联网内容培养具备一定艺术和人文科学素养的软件工程师。注重数字媒体工程实践能力，强调学科交叉与国际交流特色，重点突出数字图像处理、计算机图形学与虚拟现实、人机交互和计算机视觉等专业方向。

四、学制、毕业基本要求及学位授予

1. 本科基本学制 4 年, 弹性学习年限 3—6 年, 按照学分制度管理。
2. 数字媒体技术专业学生毕业最低学分数为 165 学分, 其中各类别课程及环节要求学分数如下表:

| 课程类别 | 通识必修 | 学门核心 | 学类核心 | 专业核心 | 专业选修 | 通识选修 | 集中实践 | 合计 |
|------|------|------|------|------|------|------|------|-----|
| 学分数 | 24 | 24 | 28 | 13 | 35 | 8 | 33 | 165 |

3. 学生修满培养方案规定的必修课、选修课及有关环节, 达到规定的最低毕业学分数, 并修完规定必修但不记学分的所有课程和环节, 德、智、体合格, 即可毕业。满足学位授予相关文件要求的, 授予工学学士学位。

五、课程设置及学分分布

(一) 通识教育课程〔必修 24 + (6) 学分 + 选修 8 学分〕

通识教育课程包括必修和选修两部分。通识选修课程按《湖南大学通识选修 (文化素质教育) 课程方案》实施, 通识必修课程如下:

| 编码 | 课程名称 | 学分 | 备注 |
|---------------|----------------------|------------|----|
| GE01101 | 毛泽东思想和中国特色社会主义理论体系概论 | 3+ (3) | |
| GE01039 | 思想道德修养与法律基础 | 1.5+ (1.5) | |
| GE01100 | 形势与政策 | 0.5+ (1.5) | |
| GE01102 | 中国近现代史纲要 | 2 | |
| GE01103 | 马克思主义基本原理 (上) | 2 | |
| GE01104 | 马克思主义基本原理 (下) | 2 | |
| GE01012 (-15) | 大学英语 | 8 | |
| GE01107 (-13) | 心理素质与生涯发展 | 1 | |
| GE01089 (-92) | 体育 | 4 | |

(二) 学门核心课程 (24 学分)

| 编码 | 课程名称 | 学分 | 备注 |
|---------|--------------|----|----|
| GE03025 | 高等数学 A (1) | 5 | |
| GE03025 | 高等数学 A (2) | 5 | |
| GE03003 | 线性代数 A | 3 | |
| GE03004 | 概率论与数理统计 A | 3 | |
| GE03005 | 普通物理 A (1) | 3 | |
| GE03006 | 普通物理 A (2) | 3 | |
| GE03007 | 普通物理实验 A (1) | 1 | |
| GE03008 | 普通物理实验 A (2) | 1 | |

(三) 学类核心课程 (28 学分)

| 编码 | 课程名称 | 学分 | 备注 |
|---------|-----------|----|----|
| CS04022 | 高等程序设计 | 4 | |
| CS04001 | 离散数学 | 4 | |
| CS05054 | 数字电路与逻辑设计 | 4 | |
| CS04023 | 计算机系统 | 4 | |
| CS04010 | 数据结构 | 4 | |
| CS04015 | 操作系统 | 4 | |
| CS04021 | 程序设计实验 | 2 | |
| CS04024 | 数字系统实验 | 1 | |
| CS04025 | 计算机系统原理实验 | 1 | |

(四) 专业核心 (13 学分)

| 编码 | 课程名称 | 学分 | 备注 |
|---------|----------|----|-------|
| CS05061 | 算法分析与设计 | 4 | |
| CS05062 | 数据库系统 | 4 | 全英文授课 |
| CS05063 | 计算机网络 | 4 | |
| CS05064 | 数字媒体系统实验 | 1 | |

(五) 选修课程 (35 学分)

1. 专业限选课程 (11 学分)

本专业学生必须选修以下课程, 以加强专业基础, 共 11 学分。

| 编码 | 课程名称 | 学分 | 备注 |
|---------|--------|----|----|
| CS06114 | 数字图像处理 | 4 | |
| CS06115 | 计算机图形学 | 4 | |
| CS05060 | 人机交互技术 | 3 | |

2. 专业任选课程 (24 学分)

专业任选课程采用方向分组与任选相结合的方式实施。建议本专业学生选修数字媒体组所有课程, 并跨组 (或跨专业) 选修课程, 共选修 8 门课程, 总计 24 学分。课程及分组如下:

| 编码 | 课程名称 | 学分 | 备注 |
|---------|------------|----|--------------------------------------|
| CS06116 | 虚拟现实 | 3 | |
| CS06117 | 数字娱乐设计与编程 | 3 | |
| CS06118 | 计算机动画 | 3 | |
| CS06119 | 计算机视觉导论 | 3 | 数字媒体组 (全选) (“计算机视觉”为全英文授课) |
| CS06120 | 3D 引擎设计技术 | 3 | |
| CS06121 | 生物特征识别 | 3 | |
| CS06122 | 信息可视化原理和方法 | 3 | |
| CS06189 | 机器学习 | 3 | |
| CS06124 | 数据挖掘 | 3 | |
| CS06065 | 生物信息学 | 3 | 信息系统组 (其中“机器学习”为“数据挖掘”与“生物信息学”的先修课程) |

注: 1) 鼓励学生自主选修本专业或跨专业选修类课程, 学分不少于应选学分的 50%。

2) 在读期间参加学科竞赛或公开发表学术论文等经学院认定 (详见《湖南大学信息科学与工程学院学术研究成果分类指导意见和技术创新成果指导意见》) 可以申请替代选修 2 学分。

(六) 集中实践环节 (33 学分)

| 课程编码 | 课程名称 | 学分 | 备注 |
|--------------|------------------------|----|---------|
| GE01040 | 军训、军事与国防 (含军事理论) | 0 | |
| CS10018 | 入学教育与专业入门 | 0 | |
| GE09030 | 中文写作实训 | 1 | 一年级夏季学期 |
| GE09028 | 英文写作实训 | 1 | |
| GE09001 | 程序设计 | 2 | |
| CS10019 | 电子系统设计 | 2 | 二年级夏季学期 |
| CS10020 | 软件设计 | 2 | |
| CS10021 (22) | 专业综合设计 三维渲染系统的设计与实现 | 4 | 三年级夏季学期 |

续表

| 课程编码 | 课程名称 | 学分 | 备注 |
|---------|----------------------|----|--|
| CS10023 | 毕业实习 | 2 | 第 8 学期 |
| CS10024 | 数据库系统设计 | 2 | |
| CS10025 | 游戏设计 | 3 | 特色实践课程 |
| CS10026 | 毕业设计 (论文) (含导师课程) | 14 | 包含 2 个学分的导师课程。导师课程是“导师制”的具体任务,本课程须是以项目驱动、“CDIO”模式、讨论方式教学,每岗每届指导学生共 3—6 人。课程内容包含:本科生学业指导、一年级与二年级学生夏季学期设计课程监管、三年级学生夏季学期设计课程指导、四年级本科生毕业实习与毕业设计指导。 |

六、课程责任教师一览表

| 序号 | 姓名 | 职称 | 学历学位 | 专业特长 | 课程 (专业核心、专业选修、通识选修) |
|----|-----|------|------|--------------|----------------------|
| 1 | 廖波 | 教授 | 博士 | 生物计算 | 离散数学 |
| 2 | 高春鸣 | 教授 | 博士 | 计算机动画 | 虚拟现实与数字娱乐, 计算机动画 |
| 3 | 王树林 | 教授 | 博士 | 生物信息处理 | 生物信息学 |
| 4 | 陈湘涛 | 副教授 | 博士 | 信息安全 | 数据挖掘 |
| 5 | 彭黎 | 副教授 | 博士 | 保密管理 | 数据库系统 (英文) |
| 6 | 李实英 | 副教授 | 博士 | 视频图像处理, 视觉计算 | 数字图像处理, 计算机视觉导论 (英文) |
| 7 | 杨胜 | 副教授 | 博士 | 机器学习 | 人机交互技术, 数字娱乐设计与编程 |
| 8 | 谭光华 | 助理教授 | 博士 | 计算机图形学 | 计算机图形学, 3D 引擎设计技术 |
| 9 | 林红利 | 助理教授 | 博士 | 数字图像处理 | 数字图像处理, 生物特征识别 |
| 10 | 潘华伟 | 助理教授 | 博士 | 计算机图形学 | 计算机图形学, 信息可视化原理与方法 |
| 11 | 肖懿 | 副教授 | 博士 | 计算机图形学 | 人机交互技术, 图形渲染系统的设计与开发 |
| 12 | 肖晟 | 助理教授 | 博士 | 信息安全 | 计算机网络 |
| 13 | 曹智 | 助理教授 | 博士 | 信息系统, 生物计算 | 离散数学、机器学习 |
| 14 | 张伟 | 助理教授 | 博士 | 信息系统 | 算法设计与分析 |

七、专业责任教授

| 序号 | 姓名 | 职称 | 学历学位 | 专业特长 | 承担授课课程 |
|----|-----|----|------|-------|------------------|
| 1 | 高春鸣 | 教授 | 博士 | 计算机动画 | 虚拟现实与数字娱乐, 计算机动画 |

Digital Media Technology

I . Objectives

On the basis of “Engineering Education Certification Standards”, graduating students should have good understanding in humanities, science and engineering, as well as a solid mathematical foundation in computer science and software engineering. They should have comprehensive theoretical knowledge in the major of Digital Media Technology, as well as scientific thinking and practical engineering skills, to encourage them to produce engineering innovations in this field. The students should also be able to solve complex engineering problems using their professional knowledge and engineering technology. Moreover, they should understand the process of project implementation and cooperation among partners from multiple disciplines so that they can independently take charge of projects. Finally, the students should master at least one foreign language, develop a global vision, and understand the frontiers in the field of Digital Media Technology, all of which will help them establish cooperation with international partners.

II . Basic Requirements

Graduating students in Digital Media Technology should have the following qualities and abilities:

1. **Engineering Knowledge:** Students need to have the knowledge from mathematics, natural science and engineering, and Digital Media Technology, to solve complex problems in Digital Media Technology.
2. **Problem Analysis:** Students need to have the ability to apply principles from mathematics, natural science and engineering to recognize, define and analyze complex engineering problems in Digital Media Technology by searching relevant literature, and finally draw a reasonable conclusion.
3. **Design and Practice:** Students need to have the ability to provide solutions for problems in complex digital media systems, and design a system, component or process to meet the specific requirements, and attempt innovation in the design process, taking into consideration factors such as public health, safety, culture, society and environment.
4. **Research:** Students need to have the ability to apply appropriate knowledge and methods to conduct research on complex engineering problems in Digital Media Technology, such as experiment planning, data analysis and discussion, and to draw reasonable conclusions via information fusion.
5. **Utilizing Modern Appliances:** Students have the ability to develop appropriate technology, or make use of existing resources and methods to solve problems, and also understand the limitations of these approaches, during various activities in digital media systems.
6. **Engineering and Sociality:** Students need to have a reasonable way of thinking about engineering-related environmental information, and to make a fair evaluation about engineering practice in terms of its responsibility and many other factors involved in areas such as sociality, health, safety, law and culture.
7. **Social and Environmental Integration:** Students have relevant knowledge to understand profes-

sional engineering solutions and their influences on society and the environment, as well as the need for sustainable development.

8. **Professional Norm:** Students need to be highly educated in the humanities and social science, behave responsibly in society and in their jobs of Digital Media Technology.

9. **Personal and Teamwork:** Students need to play effective roles as individuals, and as members or leaders in a diverse and multidisciplinary team.

10. **Communication:** Students need to have the ability to communicate with colleagues and the public in a complex engineering project by various means, including writing reports, designing documents, giving oral presentations and issuing clear instructions. Furthermore, they need to have an international outlook and the ability to communicate, compete and cooperate with cross-cultural colleagues.

11. **Project Management:** Students should understand fundamental knowledge of engineering and management, and use this knowledge to manage projects as a member or leader in a multidisciplinary environment.

12. **Life-long Learning:** Students need to have an understanding of frontier development and trends in their major. They should have a positive attitude toward lifelong learning, and be able to continuously learn and develop.

III. Program Traits

Digital Media Technology belongs to Computer Science in the undergraduate major directory from the Ministry of Education. The present program is formulated according to the criterion of professional computer and engineering requirements as well as considering the actual environment of Hunan University. On the basis of Computer Applications Technology and domain-specific Software Engineering, the students will become software engineers in cyber and internet technology who have good artistic sensibility and a good understanding of arts and social science. We require our students to have a core foundation in the knowledge from the majors of Computer Science, to emphasize their practical engineering skills in Digital Media Technology, and also to strengthen their abilities in interdisciplinary and international cooperation, especially in the areas of digital image processing, computer graphics, virtual reality, human machine interaction and computer vision.

IV. Degree Requirements

1. An undergraduate student is normally expected to graduate in four (4) years, but is also allowed to graduate in the period between three (3) and six (6) years according to the student's performance in the academic credit system.

2. The minimal requirement for academic credits is 165 credits totally for students taking the Digital Media Technology major. The detailed requirements for each of the specific courses are listed in the following table:

| Course categories | Core courses General | Core courses Domain | Core courses Discipline | Core courses Major | Electives Major | Electives General | Collective Training | Total |
|---------------------|----------------------|---------------------|-------------------------|--------------------|-----------------|-------------------|---------------------|-------|
| Credit requirements | 24 | 24 | 28 | 13 | 35 | 8 | 33 | 165 |

3. A student can graduate if he/she fulfills the course study of core courses, electives and other courses as specified in the program, and satisfies the basic requirements on morality, intelligence and health. We will confer on a student the Bachelor Degree of Engineering if they satisfy the requirements of the degree according to Hunan University policies.

V. Curriculum

1. General Education Courses [required 24+(6) + elective 8 credits]

The general education courses consist of required courses and elective courses. General education electives are designed according to the *Curriculum Design of General Education Electives of Hunan University*. Required general education courses are illustrated in the following table.

| Code | Course Title | Credit(s) | Remarks |
|--------------|---|-----------|---------|
| GE01101 | Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics | 3+(3) | |
| GE01039 | Moral Cultivation and Law Basics | 1.5+(1.5) | |
| GE01100 | Current Situation and Policies | 0.5+(1.5) | |
| GE01102 | Outline of Modern Chinese History | 2 | |
| GE01103 | Fundamentals of Marxism I | 2 | |
| GE01104 | Fundamentals of Marxism II | 2 | |
| GE01012(-15) | College English | 8 | |
| GE01107(-13) | Psychological Health & Career Planning | 1 | |
| GE01089(-92) | Physical Education | 4 | |

2. Core courses; domain (24 credits)

| Code | Course Name | Credit(s) | Remarks |
|---------|-------------------------------------|-----------|---------|
| GE03025 | Advanced Mathematics A(I) | 5 | |
| GE03025 | Advanced Mathematics A(II) | 5 | |
| GE03003 | Linear Algebra A | 3 | |
| GE03004 | Probability Theory and Statistics A | 3 | |
| GE03005 | General Physics A(I) | 3 | |
| GE03006 | General Physics A(II) | 3 | |
| GE03007 | General Physics lab A(I) | 1 | |
| GE03008 | General Physics lab A(II) | 1 | |

3. Core courses; discipline (28 credits)

| Code | Course Name | Credit(s) | Remarks |
|---------|---------------------------------------|-----------|---------|
| CS04022 | Advanced Programming | 4 | |
| CS04001 | Discrete Mathematics | 4 | |
| CS05054 | Digital Circuit and Logic Design | 4 | |
| CS04023 | Computer Systems | 4 | |
| CS04010 | Data Structure | 4 | |
| CS04015 | Operating Systems | 4 | |
| CS04021 | Programming Experiment | 2 | |
| CS04024 | Digital systems Experiment | 1 | |
| CS04025 | Computer System Principles Experiment | 1 | |

4. Core courses; major (13 credits)

| Code | Course Name | Credit(s) | Remarks |
|---------|----------------------------------|-----------|--------------------------|
| CS05061 | Algorithms Analysis and Design | 4 | |
| CS05062 | Database System | 4 | Course Taught in English |
| CS05063 | Computer Network | 4 | |
| CS05064 | Digital media Systems experiment | 1 | |

5. Electives: major (35 credits)

(1) Major restricted electives (11 credits)

In order to strengthen their knowledge base, students in the Digital Media Technology major are required to take these electives, for a total of 11 credits.

| Code | Course Name | Credit(s) | Remarks |
|---------|----------------------------|-----------|---------|
| CS06114 | Digital Image Processing | 4 | |
| CS06115 | Computer Graphics | 4 | |
| CS05060 | Human Computer Interaction | 3 | |

(2) Major non-restricted electives (24 credits)

Students in the Digital Media Technology major are advised to take all courses in the Digital Media Group, and to take one additional course from the other group or other majors; in total, eight courses of 24 credits. The non-restricted electives and their groups are listed in the following table:

| Code | Course Titles | Credit(s) | Remarks |
|---------|---|-----------|---|
| CS06116 | Virtual Reality | 3 | Digital Media Group (where introduction to computer vision is in English) |
| CS06117 | Digital Entertainment Design | 3 | |
| CS06118 | Computer Animation | 3 | |
| CS06119 | Introduction to Computer Vision | 3 | |
| CS06120 | 3D Game Engine Design | 3 | |
| CS06121 | Biometric Identification | 3 | |
| CS06122 | Introduction to Information Visualization | 3 | Information Systems Group (where machine learning is the prerequisite course of data mining and bioinformatics) |
| CS06189 | Machine Learning | 3 | |
| CS06124 | Data Mining | 3 | |
| CS06065 | Bioinformatics | 3 | |

Note: 1) Students are encouraged to sign up for elective within and across their majors, with the credit hours no less than 50% of the total required credit hours.

2) Students who take part in computer competitions or publish technical papers can apply to substitute two selective credit hours (see instructions of academic research and techniques invocation of the college of computer science and electronic engineering, Hunan University)

6. Collective training (33 credits)

| Code | Course Name | Credit(s) | Remarks |
|-------------|--|-----------|---|
| GE01040 | Military Training, Military Affairs and National Defense (Including Military Theory) | 0 | |
| CS10018 | University and "The information Security (Secrecy technology)" Major Introduction | 0 | |
| GE09030 | Practices for Chinese Writing | 1 | Summer semester of the first year of study |
| GE09028 | Practices for English Writing | 1 | |
| GE09001 | Practices for Programming | 2 | |
| CS10019 | Practices for Digital Systems Design | 2 | Summer semester of the second year of study |
| CS10020 | Practices for Software Design | 2 | |
| CS10021(22) | Major Specific Integrated Design Design and Development of 3D Rendering System | 4 | Summer semester of the third year of study |
| CS10023 | Internship for Graduation Project | 2 | Spring semester of the fourth year of study |
| CS10024 | Database System Design | 2 | |

Cont

| Code | Course Name | Credit(s) | Remarks |
|---------|--|-----------|---|
| CS10025 | Game Design | 3 | Major specific practices |
| CS10026 | Graduation Project(including mentor courses) | 14 | Mentor courses (2 credits) are included. Mentor courses are the tasks of the mentor system. These courses are project-driven with “CDIO” model, and are taught by discussions. Every mentor takes charge of 3—6 students of each class year. The course contents include: academic guidance for undergraduate students, monitoring on summer semester design courses for first and second year undergraduate students, mentoring on summer semester design courses for third year undergraduate students, mentoring on graduation project and internship for forth (final) year undergraduate students. |

VI. Major Course Teachers

| No. | Name | Title | Education | Research Domain | Courses |
|-----|---------------|---------------------|-----------|---|--|
| 1 | Liao Bo | Professor | Ph. D | Biometric Computing | Discrete Mathematics |
| 2 | Gao Chunming | Professor | Ph. D | Computer Animation | Virtual Reality and Digital Entertainments, Computer Animation |
| 3 | Wang Shulin | Professor | Ph. D | Biological Information Processing | Bioinformatics |
| 4 | Chen Xiangtao | Associate Professor | Ph. D | Information Security | Data Mining |
| 5 | Peng Li | Associate Professor | Ph. D | Confidentiality management | Database System(in English) |
| 6 | Li Shiyong | Associate Professor | Ph. D | Video/Image Processing, Computer Vision | Digital Image processing, Introduction to Computer Vision (in English) |
| 7 | Yang Sheng | Associate Professor | Ph. D | Machine Learning | Human Computer Interaction, Digital Entertainment Design |
| 8 | Tan Guanghua | Assistant Professor | Ph. D | Computer Graphics | Computer Graphics, 3D Game Engine Design |
| 9 | Lin Hongli | Assistant Professor | Ph. D | Digital Image Processing | Digital Image Processing, Biometric Identification |
| 10 | Pan Huawei | Assistant Professor | Ph. D | Computer Graphics | Computer Graphics, Introduction to Information Visualization |

Cont

| No. | Name | Title | Education | Research Domain | Courses |
|-----|------------|---------------------|-----------|---|--|
| 11 | Xiao Yi | Associate Professor | Ph. D | Computer Graphics | Human Computer Interaction, Graphics Rendering System Design |
| 12 | Xiao Sheng | Assistant Professor | Ph. D | Information Security | Computer Network |
| 13 | Cao Zhi | Assistant Professor | Ph. D | Information System, Biometric Computing | Discrete Mathematics, Machine Learning |
| 14 | Zhang Wei | Assistant Professor | Ph. D | Information System | Algorithms Analysis and Design |

VII. Professor-in-charge

| No. | Name | Title | Education | Research Domain | Courses |
|-----|--------------|-----------|-----------|--------------------|--|
| 1 | Gao Chunming | Professor | Ph. D | Computer Animation | Virtual reality and digital entertainments, Computer animation |

(翻译人:李实英)