

Digital Production Arts (DPA)

Program Handbook

Fall, 2010

Introduction/History

At its meeting on November 5, 1998, the South Carolina Commission on Higher Education approved the Clemson University proposal for the Master of Fine Arts in Computing degree. This advanced degree program, renamed as the Digital Production Arts (DPA) program in 2002, is aimed at producing graduates who intend to seek employment in the technology-based, electronic arts industry, in particular, in special effects production for the entertainment and commercial video and film industries.

The Program was begun, on a resource-limited basis, in the Fall of 1999. Increased resources allowed an expanded operation to begin in the Fall of 2000, and full operation began in fall of 2001. This document is intended to serve as a guide to those students and faculty at Clemson University who are participating in the Program.

Program Administration

The DPA Program is truly inter-disciplinary in design; however, it is currently housed within the School of Computing. The program is administered by the DPA Board, which is composed of six Clemson University faculty members. One is the director of the DPA program, two must be from the Department of Art, two must be from the Department of Computer Science, and one must be from the Department of Performing Arts. Faculty are elected to these positions by their departments. Terms are two years and renewable. The program director is chair of the Board. At present, the Board members include: Jerry Tesendorf (Program Director), Timothy Davis (School of Computing), David Donar (Art), Robert Geist (School of Computing), Don House (School of Computing), Tony Penna (Performing Arts), and Mike Vatararo (Art).

The Program Director is responsible for the daily operation of the DPA Program and serves as the instructor for the Visual Arts Studio course (see DPA 860 under Curriculum), amongst other duties. The Director is evaluated by the DPA Board; the Board makes recommendations to the Dean of the Graduate School. As specified in the approved CHE proposal, the DPA Board may, by majority vote, change any components of the Program at any time. Changes to the curriculum requirements follow standard University procedure; in particular, enrolled students have the option of completing the new requirements or the requirements in place at the time of their enrollment.

Curriculum

At present, the degree requires 60 credit hours, 12 of which are devoted to Digital Production Studio (DPA 860), wherein the student participates in group production work; and 6 of which are devoted to Graduate Research Studio, where students may choose to continue work on a team project, or pursue an individual project or production. Of the remaining 42 hours, 15 must come from the Core Courses (listed below), 6 from the Master's Thesis (ART/CPSC 891), and the remainder from Electives (listed below) or Foundation Courses (listed below).

Foundations Courses (0, 3 or 6 credits, as directed on admission)

The Foundation Courses are intended for those entering students who, due to insufficient background, are not prepared to begin graduate level work in either Art or Computing. Up to two foundations classes may be required as directed by the admissions committee upon examination of the student's portfolio and record of coursework. Students requiring more than two foundations courses will be asked to make up any extra deficiencies before admission.

- DPA 601 Technical Foundations I (F)
DPA 602 Technical Foundations II (S)

These courses include introductions to the algorithmic and mathematical bases of computer graphics. Courses will provide students with practical experience in C/C++ programming, scripting, linux/unix operating systems, spatial data structures, mathematics for graphics, and interactive graphics API. Students will complete a series of visually grounded programming projects.

- DPA 603 Visual Foundations I (F)
DPA 604 Visual Foundations II (S)

These courses include introductions to observational drawing and clay modeling, color, principles of composition and design, and photography. Courses incorporate the studio method, involving students in hands-on work and the critique process, and stress examples from the history of art.

Core Courses (15 credits)

The core courses provide a broad underlying artistic, technical, and studio methods foundation for advanced study, leading to original studio and research work. If a student has taken a course of comparable content at Clemson University or elsewhere, an Elective Course (listed below) may be substituted (decisions on comparable content will be made by the DPA Board).

Although only five courses are required, a sixth course may be chosen towards the Open Electives requirement. All students must complete five of the following courses:

Artistic Core

- THEA 687 Stage Lighting I (F, S)
- ART 821 Visual Narrative (S)

Technical Core

- CPSC 606 Digital Image Manipulation (F)
- CPSC 607 Rendering and Shading (S)

Studio Methods Core

- CPSC 807 3D Modeling and Animation (S)
- CPSC 815 Digital Compositing (F)

Aesthetics and Theory Electives (3 credits)

The aesthetics and theory electives provide an introduction to the analysis and conceptual foundation of visual presentation. Although only one course is required, an additional course may be chosen towards the Open Electives requirement. All students must complete one of the following courses:

- AAH 630 Twentieth Century Art I
- AAH 632 Twentieth Century Art II
- ENGL 650 Film Genres
- ENGL 651 Film Theory and Criticism
- ENGL 853 Visual Communication
- PHIL 845 Aesthetics

Open Electives (12-18 credits)

The Open Electives provide an opportunity for students to either develop a special expertise, or broaden their background to support studio and thesis work. Approved electives are offered in the areas listed below. An additional Core Course or an additional Aesthetics and Theory Elective may be used towards this requirement. The student's thesis committee, subject to review by the DPA Director, may approve other courses. All students must complete at least four Open Electives.

Artistic Electives

- ART 605 Advanced Drawing
- ART 607 Advanced Painting
- ART 609 Advanced Sculpture
- ART 611 Advanced Printmaking
- ART 613 Advanced Photography
- ART 617 Advanced Ceramic Arts

Technical Electives

- CPSC 605 Computer Graphics
- CPSC 611 Virtual Reality
- CPSC 614 Human and Computer Interaction
- CPSC 616 2D Game Engine Design
- CPSC 805 Advanced Computer Graphics
- CPSC 809 Physically Based Animation
- CPSC 863 Multimedia Systems and Applications

Studio Methods Electives

- DPA 808 Advanced Animation
- DPA 819 Visual Special Effects

General Electives

- ECE 847 Digital Image Processing
- GC 801 Process Control in Color Reproduction
- MUSC 604 Electronic Music
- PSY 823 Human Perception and Cognition
- THEA 697 Scene Painting

Digital Production Studio (12 credits)

DPA 860, the digital production studio, provides the student with the opportunity to develop as accomplished visual problem solvers in a team setting. As part of the studio experience, students must complete 12 credits on a team-oriented production project, in which they will work on a project from concept through finished piece. This process provides an experience of working on a goal-oriented artistic team.

Students begin the studio sequence by taking the course for one credit each semester of their first year. This familiarizes students with the team process workflow, while allowing them to develop core skills and knowledge through coursework. After the first two semesters, students work on a team project for two consecutive terms, either summer-fall or fall-spring.

The digital production studio includes regular class meetings, under faculty supervision, providing the vehicle for planning, critique, and presentation of ongoing project work. Although a large majority of studio work is undertaken outside of class meetings, active participation in class is crucial to a successful studio experience, and is required.

Up to 6 hours of credit for the course may also be obtained through a Board-approved summer internship at a professional production studio.

- DPA 860 Digital Production Studio

Graduate Research Studio (6 credits)

DPA 880, the graduate research studio, provides students with the opportunity to complete a major project or projects, under the supervision of a faculty advisor, in a direction supporting their personal goals and aspirations. Such work may be team oriented or individually oriented, and may be of a technical or of an artistic nature. All students must complete 6 credits of research studio.

- DPA 880 Graduate Research Studio

M.F.A. Thesis (6 credits)

DPA 891, the M.F.A. thesis course, consists of a studio project, undertaken with the guidance of the student's advisor and thesis committee. The thesis project is developed to a refined degree, articulated in the form of a written document, and presented orally in a thesis defense. The project is intended to elaborate and refine a theme that the student has begun to explore in the elective coursework and the production and research studios.

- DPA 891 M.F.A. Thesis

Sample Course Sequences

Each student brings a different collection of strengths and weaknesses to the Program, and an appropriate course sequence must be tailored to both the individual's needs and course availability. Nevertheless, we can suggest some typical course sequences that would be appropriate for differing backgrounds.

Strong Art/Weak Computing Background

Semester 1

- DPA 601 3 Technical Foundations I
- CPSC 807 3 3D Modeling and Animation
- THEA 687 3 Stage Lighting I
- DPA 860 1 Digital Production Studio

Semester 2

- DPA 602 3 Technical Foundations II
- ART 821 3 Visual Narrative
- ENGL 650 3 Film Genres
- THEA 697 3 Scene Painting
- DPA 860 1 Digital Production Studio

Summer 1

- DPA 860 6 Digital Production Studio

Semester 3

- CPSC 606 3 Digital Image Manipulation

- CPSC 815 3 Digital Compositing
- ART 613 3 Advanced Photography
- DPA 860 4 Digital Production Studio

Semester 4

- THEA 687 3 Stage Lighting I
- DPA 808 3 Advanced Animation
- DPA 880 6 Graduate Research Studio

Summer 2

- DPA 891 6 M.F.A. Thesis

Strong Computing/Weak Art Background

Semester 1

- DPA 603 3 Visual Foundations I
- CPSC 606 3 Digital Image Manipulation
- CPSC 807 3 3D Modeling and Animation
- DPA 860 1 Digital Production Studio

Semester 2

- DPA 604 3 Visual Foundations II
- CPSC 607 3 Rendering and Shading
- ART 821 3 Visual Narrative
- ENGL 650 3 Film Genres
- DPA 860 1 Digital Production Studio

Summer 1

- DPA 860 6 Digital Production Studio

Semester 3

- CPSC 809 3 Physically Based Animation
- CPSC 815 3 Digital Compositing
- ART 613 3 Advanced Photography
- DPA 860 4 Digital Production Studio

Semester 4

- THEA 687 3 Stage Lighting I
- DPA 808 3 Advanced Animation
- DPA 880 6 Graduate Research Studio

Summer 2

- DPA 891 6 M.F.A. Thesis

Balanced Background

Semester 1

- CPSC 807 3 3D Modeling and Animation

- CPSC 606 3 Digital Image Manipulation
- THEA 687 3 Stage Lighting I
- DPA 860 1 Digital Production Studio

Semester 2

- CPSC 607 3 Rendering and Shading
- ART 821 3 Visual Narrative
- THEA 697 3 Scene Painting
- ENGL 650 3 Film Genres
- DPA 860 1 Digital Production Studio

Summer 1

- DPA 860 6 Digital Production Studio

Semester 3

- CPSC 805 3 Advanced Computer Graphics
- CPSC 815 3 Digital Compositing
- ART 613 3 Advanced Photography
- DPA 860 4 Digital Production Studio

Semester 4

- CPSC 616 3 2D Game Engine Design
- DPA 808 3 Advanced Animation
- DPA 880 6 Graduate Research Studio

Summer 2

- DPA 891 6 M.F.A. Thesis

Timelines

The following charts show both two-year and three-year paths through the curriculum.

2 Year Curriculum

(3) Art or Technical Foundations 1	(3) Art or Technical Foundations 2
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Foundations

(3) Core 1	(3) Core 3
(3) Core 2	(3) Core 4

Core

(3) Core 5

(3) Aesthetics/ Theory Elective

Aesthetics/ Theory

(3) Elective 3	(3) Elective 5
(3) Elective 4	(3) Elective 6

Electives

(3) Elective 1	(3) Elective 2
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(1) Production Studio	(1) Production Studio	(6) Production Studio	(4) Production Studio	(6) Research Studio	(6) Thesis
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Studio

(10)	(13)	(6)	(13)	(12)	(6)
Fall Fall	Spring Spring	Summer Summer	Fall Fall	Spring Spring	Summer Summer

Example 2 year
timeline
sequence

3 Year Curriculum

Foundations

(3) Art or Technical Foundations 1	(3) Art or Technical Foundations 2	
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Core

(3) Core 1	(3) Core 3
(3) Core 2	(3) Core 4

(3)
Core 5

(3)
Aesthetics/
Theory Elective

Electives

(3) Elective 1	(3) Elective 2
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(3)
Elective 3

(3)
Elective 4

(3)
Elective 5

(3)
Elective 6

Studio

(1) Production Studio	(1) Production Studio	(6) Production Studio	(4) Production Studio	(6) Research Studio	(6) Thesis
(10) Fall	(10) Spring	(12) Fall	(10) Spring	(9) Fall	(9) Spring
		(0) Summer			(0) Summer

Example 3 year
timeline

Program Equipment

At the time of this writing, the special effects industry continues to use Maya as the standard animation package. Accordingly, the Program is currently committed to the Maya platform as an instructional basis. The program has an extensive set of other software that changes periodically as new technology emerges.

The DPA facilities suite is located in 118 McAdams Hall. The main lab/classroom contains 24 seats of our fastest Mac/Linux computers with dual monitors. Additionally, we have a large studio space complete with a Vicon 8-camera motion capture facility and a greenscreen area with lighting rigs. Students also have access to a sound booth, video editing room, and research space.

DPA also has access to the School of Computing graphics facilities, which include numerous Linux workstations and virtual reality equipment, all of which reside in a recently remodeled facility with gigabit networking throughout.

Assistantships

A small number of assistantships are available within the Program. Assistants should report to the Program Director to receive assigned duties. Assistantships are generally 9 months, but they can be extended through the summer term. Assistantships are renewable for a second year, but such depends upon availability and student progress. Other assistantships are typically available in many departments across the university; nearly all of our students who desire an assistantship are usually able to find one, as DPA students are highly sought. Please see the Program Director for possible appointments. Additionally, those students with strong computing backgrounds can see the Director of Graduate Studies in the Department of Computer Science to check availability. Those students with strong art backgrounds can see the Chair of the Art Department.

Internships

Summer internships at production studios are highly desirable, and it is a goal of the Program to assist all qualified students in securing such positions. Internships are competitive and successful applicants usually have two important components: a strong demo reel and a strong recommendation from someone whom the studio knows and trusts. Building a strong demo reel in the first year is a difficult challenge. Those students interested in internships should select an advisor who can assist with this task as early as possible, preferably no later than the end of the first semester. Strong recommendations are not given lightly, in that they reflect on the strength of the program and affect future relationships with the studio in question. The studios want to see two pairs of antithetical characteristics in every applicant: an artist and a scientist. In addition, they want a creative, original thinker and a cooperative team player. Accordingly, all four factors are

weighted equally in making recommendations. The bottom line for assistantships: both attitude and work quality count.

Student Forms

- **GS-2 (Plan of Study and Graduate Degree Curriculum)**
All students must complete the Graduate Degree Curriculum form GS-2 no later than the beginning of the second academic year. This form lists both the student's planned curriculum and the student's Advisory Committee. The Advisory Committee is selected by the student with consent of the faculty selected. The Committee must include at least two DPA Board members, and (optionally) one additional Clemson University faculty member. Any Board member may serve as the Committee Chairperson. The Chairperson is the student's principal advisor. The DPA Board Chair signs as Department Head and the Dean of the Graduate School signs as College Dean. The Advisory Committee will read the Master's Thesis, hear the Thesis defense, and decide, by majority vote, on a pass/fail for the Thesis.
- **GS-4 (Application for Graduation and Diploma Order)**
- **GS-7 (Oral Presentation/Defense)**
Your advisor should bring this form to your thesis oral presentation/defense.

Thesis Timeline

Below is an outline of when different forms and decisions related to the thesis should be made. Students may always submit forms or make the decisions listed below earlier than noted.

- Spring semester, year 1: Select thesis/academic advisor
- Summer semester, year 1: Select thesis committee
- Fall semester, year 2: Submit GS-2 form
- Start of Spring semester, year 2 (check these dates against the academic schedule of the semester you wish to graduate, available on the graduate school webpages):
 - Submit GS-4 (must be completed second week)
 - Order cap and gown (must be completed third week)
 - Schedule thesis presentation/defense date with committee
 - Complete and distribute final draft of thesis to thesis committee (two weeks prior to defense date)
 - Conduct oral thesis presentation/defense (at least two weeks prior to graduation date)

SIGGRAPH Description and Timeline

SIGGRAPH (Special Interest Group, GRAPHics) is the pre-eminent computer graphics conference in the world, and includes the most prestigious computer animation festival in the world. DPA participation is therefore highly desired.

One of the stated goals of the DPA program is to submit to this animation festival annually, with DPA 860 being the primary means of producing animations for submission – both by groups and individuals. In order to complete the large-scale, group projects by the March due date each year, a very general outline of the production process for DPA 860 group projects is as follows:

- **Late March/early April**
 - brainstorm ideas for next year (or recycle ideas that were tabled the past year)
- **April**
 - select and refine stories
 - compose scripts for these stories.
- **May-June**
 - refine scripts
 - determine look of each piece (art direction)
 - begin storyboarding the scripts
- **June-August**
 - refine and complete storyboards/story reel
 - begin modeling and research in problem areas likely to occur in each animation
- **Late July/Early August**
 - attend annual SIGGRAPH conference.
- **Fall semester**
 - complete modeling process
 - complete animatics (redo any necessary storyboards to reflect animatics)
 - complete rigging
 - finalize “look and feel” (rendering/lighting/texturing/compositing)
 - perform special effects research
 - begin sound
 - compose/research effects and music
 - begin rough animation.
 - begin final render tests
 - begin applying special effects research into real shots
- **Winter Break**
 - continue work on animation, texturing and lighting
 - resolve any outstanding issues from fall semester

- **January**
 - complete all texturing and lighting setups
 - complete rough animation work
 - complete final render tests and run test animation sequences through the render/compositing pipeline to ensure feasibility
 - place special effects elements into shots
 - continue work on or complete sound effects
 - create a “rough cut” of the animation with available animation work—examine for elements which need more work or rethinking
- **February**
 - complete final animation work (early in the month)
 - set up the render/compositing pipeline to handle each shot as final animation is complete
 - complete sound effects and edit into rough cut
 - integrate special effects into completed animation sequence
 - continue to refine rough cut edit as new elements arrive
- **March** (including Spring Break, if the SIGGRAPH due date is past this break):
 - complete work on animations, including sound, compositing, video editing and final polishing
 - NOTE: a completed edit of the entire animation should be completed AT LEAST one week prior to the submission date; this allows time for any last-minute problems to be resolved
- **Late March/Early April:**
 - begin the whole process again!