Digital Production Arts (DPA)
Program Handbook
2019-2020

Introduction

The *Digital Production Arts* (DPA) program is aimed at producing graduates who intend to seek employment and/or study in the technology-based, electronic arts industry including visual effects and animation production for the film, electronic games, and commercial video industries. The DPA program offers two degrees, the *Master of Fine Arts* and the *Master of Science*.

In 1998, the South Carolina Commission on Higher Education (CHE) approved the Clemson University proposal for the *Master of Fine Arts in Computing* degree. 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. In 2002, the title of the program was changed to the current *Master of Fine Arts in Digital Production Arts*. In 2017, the CHE approved the *Master of Science* in DPA This document is intended to serve as a guide to those students and faculty at Clemson University who are participating in the Program.

The two graduate programs offered by the DPA Program both focus on the digital art production process. Although the MFA program's home is in School of Computing, it is inter-disciplinary in design and is *a terminal degree in Art* that allows academics to teach and pursue tenure track positions in Art and related disciplines. As an accreditation requirement (by NASAD, the accrediting agency for Art) the MFA demands 60 credit hours. By contrast, the MS is a non-terminal degree requiring only 30 credit hours (as is common for other MS degrees). The MS is designed primarily to attract technically-minded students with the focus of learning applied technical knowledge and gaining the related experience to become competitive and pursue employment as a programmer, software developer, or tool builder in the digital production industry.

Program Administration

The DPA Program has its administrative home in the Division of Visual Computing, within Clemson's School of Computing, with facilities in McAdams and Barre Halls. In 2016, the DPA program opened its doors in a second location, in North Charleston, SC with the opening of the Zucker Family Graduate Education Center (ZFGEC).

Although the program's home is in Computing, it is truly inter-disciplinary in design. 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 School of Computing, and one must be from the Department of Performing Arts. Board members are elected to these positions by their department or school. Terms are two years and renewable. The Director is chair of the Board.

The Director is responsible for long-term planning and the daily operation of the DPA Program and serves on the program's faculty. The Director is evaluated by the DPA Board, which makes recommendations to the Chair of Visual Computing. 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 any new requirements or the requirements in place at the time of their enrollment.

In addition to the director, key administrative staff within DPA program is the Associate Director and the Administrative Coordinator. These positions work with the Director to operate the DPA Program consistent with University procedures and practices, and to provide for the smooth running of the Program. The Coordinator also has a major outreach responsibility, providing a key point of interface to prospective students, alumni, other universities, and companies that the program has relations with.

MFA Curriculum

The MFA degree requires 60 credit hours. The program is officially listed as a 2-year program, but most students will find that a 2-1/2 or 3-year pace is more realistic and results in a stronger grounding in the field, for example with the development of a stronger exit portfolio. Of the 60 credit hours, 12 are devoted to *Digital Production Studio* (DPA 8600), wherein the student participates in group production work; 6 are devoted to *Graduate Research Studio* (DPA 8800), where students may choose to continue work on a team project, or pursue an individual project or production; and 6 are devoted to the *Master of Fine Arts Thesis* (DPA 8910). Of the remaining 36 hours, 15 must come from specified *Core Courses*, and the remainder from approved *Electives* or *Foundation Courses*.

By University policy, full time status is defined as being enrolled in 9 credit hours in fall and spring and 3 credit hours in each summer session.

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 beginning study.

DPA   6000   Technical Foundations I (F)
DPA   6010   Technical Foundations II (S)

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

        DPA   6020   Visual Foundations I (F)
        DPA   6030   Visual Foundations II (S)

These courses include introductions to observational drawing and clay modeling, color, principles of composition and design, photography, and storyboarding. 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 the broad underlying artistic, technical, and studio method foundations 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 Director.

All students must complete five of the following core courses. Although only five courses are required, students are highly encouraged to take all six. The sixth course may be put towards the Electives requirement:

        DPA   8070   3D Modeling and Animation
        DPA   8090   Rendering and Shading
        DPA   8150   Special Effects Compositing
        CPSC 6040   Computer Graphics Images
        ART   8210   Visual Narrative *
        THEA 6870   Stage Lighting I (or Special Topics course with CG Lighting)

*ART 8210 also counts as fulfilling the Theory Elective described next.

Electives (15-21 credits)

Electives are broken down into the following categories: Theory, Artistic, Technical, Studio Methods and General electives. At least one course must and at most two may be taken from the *Theory* elective list. All other electives may be split among the remaining groups.

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 may be used towards this requirement.

The student's thesis committee, subject to review by the DPA Director, may approve other courses.

Theory Electives

All students must complete one theory course. The list of allowed courses appears below. The theory elective provides an introduction to the analysis and conceptual foundation of visual presentation. Although only one course is required, one additional course from this list may be chosen towards the Electives requirement.

        AAH   6300   Twentieth Century Art I
        AAH   6320   Twentieth Century Art II
        ART   8210   Visual Narrative
        ENGL 6500   Film Genres
        ENGL 6510   Film Theory and Criticism
        ENGL 8530   Visual Communication

Artistic Electives

        DPA   6820   Special Art Topics in DPA*
        ART   6050   Advanced Drawing
        ART   6070   Advanced Painting
        ART   6090   Advanced Sculpture
        ART   6110   Advanced Printmaking
        ART   6130   Advanced Photography
        ART   6170   Advanced Ceramic Arts
        THEA 6720   Improvisation
        THEA 6970   Scene Painting
        AUD   6800   Audio Engineering II

Technical Electives

        DPA   6810   Special Technical Topics in DPA*
        CPSC 6050   Computer Graphics
        CPSC 6110   Virtual Reality
        CPSC 6140   Human and Computer Interaction
        CPSC 6160   2D Game Engine Design
        CPSC 6780   General Purpose Computation on Graphical Processing Units
        CPSC 8050   Advanced Computer Graphics
        CPSC 8110   Technical Character Animation
        CPSC 8170   Physically Based Animation
        CPSC 8630   Multimedia Systems and Applications

Studio Methods Electives

        DPA   6830   Special Studio Topics in DPA*

DPA 8080 Advanced Animation
CPSC 8190 Physically Based Visual Effects

*DPA6800-series is repeatable as long as the topic is not repeated within the given courses.

General Electives
ECE 8470 Digital Image Processing
GC 8010 Process Control in Color Reproduction
PSY 8220 Human Perception and Performance

Digital Production Studio (DPA 8600) (12 credits)

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.

Each 8600 will be 6 credits long, comprising a substantial team-based production project. The type of production is driven by the specific choice of the faculty instructor of each offering, e.g. animated-short, or video game. Further, while the 8600 studio experience is typically covered in the second year, students in good standing may take 8600 in their first year, with consent of instructor.

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.

Graduate Research Studio (DPA 8800) (6 credits)

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 the student's personal goals and aspirations. Such work may be team-oriented or individually-oriented, and may be of a technical or of an artistic nature. Many students will use this course as an opportunity to do an initial exploration of ideas that will lead to their Thesis project. All students must complete 6 credits of research studio.

Up to 6 hours of credit for DPA 8600 or DPA 8800 may be obtained for a summer internship experience at a professional production studio approved by the DPA Director.

M.F.A. Thesis (DPA 8910) (6 credits)

M.F.A. Thesis 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.

MS Curriculum

The basic requirement for the DPA M.S. is successful completion of 30 credit hours of approved courses. Students are able to select a coursework-only non-thesis option, or complete a thesis, under faculty supervision, in lieu of two courses.

Students may select the thesis option which includes 6 credit hours of thesis preparation via DPA 8920. At least 15 of the 30 credit hours must be at the 8000 level, excluding thesis (DPA 8920). Students may include up to 6 hours of approved courses of non-technical DPA coursework. Pre-approved coursework is listed below. Other courses would require approval of the DPA Director. These hours may include graduate courses transferred from another university up to 6 credit hours.

A student must have a grade point average of at least 3.0 in the 30 credit hours used to satisfy the requirements for graduation. All requirements of the Graduate School for the M.S. degree must also be met.

Core Courses (12 credits)

Students must complete four of the following core courses. Although only four courses are required, students are highly encouraged to take all five. The fifth course may be chosen towards the Electives requirement. A student deemed to have course experience equivalent to any of the core courses may choose a replacement elective:

CPSC	6040	Computer Graphics Images
CPSC	6050	Computer Graphics
DPA	8070	3D Modeling and Animation
DPA	8090	Rendering and Shading
DPA	8150	Special Effects Compositing

Technical Electives (12-18 credits)

The Technical 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. Additional Core Courses may be used towards this requirement. The DPA Director may approve other courses based on specific future offerings. All students must complete at least four Electives.

CPSC	6110	Virtual Reality

CPSC	6140	Human and Computer Interaction
CPSC	6160	2D Game Engine Design
CPSC	6780	General Purpose Computation on Graphical Processing Units
CPSC	8040	Visualization
CPSC	8050	Advanced Computer Graphics
CPSC	8080	Advanced Animation
CPSC	8170	Physically Based Animation
CPSC	8110	Character Animation
CPSC	8190	Physically Based Visual Effects
CPSC	8700	Software Construction
DPA	6810	Special Topics in DPA (Technical)

In addition to the courses outlines above, Technical Electives can also include up to 6 credits in any 8000-level CPSC course offered.

Non-Technical DPA Electives (up to 6 credits)
The Non-Technical Electives provide an opportunity for students to either develop knowledge in a special area of expertise or broaden their background to support digital art production. Pre-approved electives are listed below. Note that admission to courses outside of DPA or CPSC typically require approval of the instructor and assume previous background.

DPA	6020	Visual Foundations for Digital Production I
DPA	6030	Visual Foundations for Digital Production II
DPA	6820	Special Topics in DPA (Art)
DPA	6830	Special Topics in DPA (Studio)
ART	6050	Advanced Drawing
ART	6070	Advanced Painting
ART	6090	Advanced Sculpture
ART	6110	Advanced Printmaking
ART	6130	Advanced Photography
ART	6170	Advanced Ceramic Arts
ART	8210	Visual Narrative
THEA	6720	Improvisation
THEA	6970	Scene Painting
AUD	6800	Audio Engineering II

Thesis (DPA 8910) (6 credits)

M.S. Thesis consists of a studio or research project, undertaken with the guidance of an academic 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 explore a new topic or elaborate and refine a theme that the student has begun to explore in the core or elective coursework.

Facilities and Equipment

In the visual effects industry, Maya continues to be the standard animation package, and studios that develop their own animation software use Maya as a foundation. More recently, Houdini has established itself as a key tool for visual effects work, Nuke for compositing and post production, and Substance Painter for 3D painting. Accordingly, the Program is currently committed to these platforms as an instructional basis. In addition, the Program is developing an in-house Linux-based production pipeline system that provides the glue for all of the commercial software and greatly enhances our ability to produce high-quality production projects. The program has an extensive set of other software that changes periodically as new technology emerges.

The DPA program's Clemson, SC facility is designed to closely parallel facilities at major animation and effects studios. Located in the main School of Computing building, McAdams Hall, we have a large multi-purpose studio, a classroom, a screening room, and an auxiliary student workroom. In nearby Barre Hall, we have an additional studio. The multi-purpose studio holds 21 high powered dual-screen workstations, a 14 camera Vicon motion capture system, and a green screen area for live action shots. The classroom has seats and computers for 20 students, allowing interactive lectures and hands-on instruction. The screening room houses a cinema-grade projector and computers, allowing review of work and screening films at the resolution, brightness, and contrast experienced in a commercial or professional theater. The screening room also has a workstation that is used for presentations, technical demos, and remote reviews with companies for collaboration. The student workroom houses additional work stations for DPA student use. A collection of iMacs with Cintiq tablets allow students to sketch out their latest story ideas or paint surfaces for a character in production. A new MacPro workstation gives students access to high resolution video editing tools. In addition to the workstations, the workroom provides storage lockers for personal belongings, a refrigerator and microwave, and a break area where students can play video games. The Barre Hall studio is used for teaching foundation art classes, providing space for teaching traditional visual foundations of the discipline.

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 modern facility with gigabit networking throughout. The University provides access to the Palmetto Cluster, a Linux cluster of over 21,000 cores and 440 NVIDIA Tesla GPUs that ranks in the top 5 fastest academic supercomputers. Our Visual Effects and Production Studio courses make heavy use of Palmetto for rendering and simulation work.

Financial Assistance

The DPA program offers financial assistance primarily in the form of partial tuition waivers, which reduce the overall cost of DPA by directly reducing tuition. These reductions are merit-based, meaning that students are evaluated based on their portfolio and previous record upon admission to the program. These awards are renewed ongoing assuming the student maintains satisfactory performance. If the student does not remain in good

standing, the award may not be renewed following a review of the Director. Assistantships may also be awarded to students, but must be approved by the Director before the student accepts the award. Notably, assistantships with institutional GAD are not allowed. Additionally, students may refer to the Financial Aid website for other available aid on campus. Students may also benefit from applying to university-wide student scholarships and awards.

Student Forms

The following GS student forms are available on the Clemson University Graduate School website: http://www.clemson.edu/graduate/students/forms.html

- **GS2** (Plan of Study and Graduate Degree Curriculum) - *iRoar*
  All students must complete and submit the Graduate Degree Curriculum form GS2 by the middle of their second semester. The final version of the student's GS2 must be on file by the date specified by Enrolled Services (graduation deadlines can be found on the deadlines page at www.clemson.edu/graduate/students/deadlines.html), or a late fee of $25 for the first day and $5 for every additional day will be charged. 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 three Clemson University graduate faculty members, at least two of whom are DPA Board members (unless an exception is approved in advance by the DPA director). The Chairperson is the student's principal advisor. The DPA Director signs as Program Coordinator, the School of Computing Director as Department Head and the Dean of the College of Engineering and Science 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. As of Spring 2015 semester, the GS2 form is completed and submitted by the student electronically through their iRoar account.

- **GS4** (Application for Graduation and Diploma Order) - *iRoar*
  As of Spring 2014, this form is no longer used. To apply for graduation, students must do so electronically through their iRoar account. Choose "Apply for Graduation" under the "Student Record" menu. If you have questions or problems about applying for graduation, please call Enrolled Services at 864-656-5339 or email weartha@clemson.edu

- **GS7M** (Final Exam and Thesis Approval Form)
  Your advisor should bring this form to your thesis oral presentation/defense.

- **GS2000** (Graduate Assistant Tuition Remission Form)
  This form is required for each appointment period and assistantship title change and must be completed by department personnel and the graduate assistant.

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

- Fall semester, year 2: Select thesis committee

- Fall semester, year 2: Submit GS2 form

- Semester of graduation (check these dates against the academic schedule available on the graduate school webpages):
    - Submit GS4 (must be completed by second week)
    - Order cap and gown (must be completed by 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)