N442
ADV 3D Animation Techniques
Department of Media Arts and Science / Human-Centered Computing / Indiana University School of Informatics and Computing, Indianapolis
Fall 2013

Section No.: 25713  Credit Hours: 3
Time: Wednesdays 6:00–8:40 pm
Location: IT 255, Informatics & Communications Technology Complex
535 West Michigan Street, Indianapolis, IN 46202 [map]
First Class: August 19, 2013
Website: https://oncourse.iu.edu/portal/site/ FA13-IN-NEWM-N442-25713

Instructor: Zebulun M. Wood, MS in Technology, Lecturer
Office Hours: W, Th, 1-5, and/or by Appointment
Office: IT 463, Informatics & Communications Technology Complex
535 West Michigan Street, Indianapolis, IN 46202 [map]
Phone: 317-278-4140 (Office),
Email: zwood@iupui.edu
Website: http://www.indianauploaded.org (personal_affiliate)

TA: First Name Surname, Highest Degree in Major, Academic Title
Office Hours: Weekday, Hour range, or by Appointment
Office: WK ### Email: email@iupui.edu Phone: (###) ###-####

Prerequisites: NEWM-N 342

COURSE DESCRIPTION
Advanced techniques in computer animation, including character development and dynamics. Possible topics include story development, character facial animation and locomotion, dynamics, special effects, composites, fluid effects and particle systems.

Highly Recommended Text(s):
Animators Survival Kit
Richard Williams
• Publisher: Faber & Faber; First Edition edition (January 7, 2002)
• ISBN-10: 0571202284
Stop Staring Stop Staring: Facial Modeling and Animation Done Right
Jason Osipa

• Publisher: Sybex; 3 edition (October 12, 2010)
• ISBN-10: 0470609907

Additional Readings: (if required)
Supplementary Text: Author: Digital Tutors/Gnomon
Title: 1 month membership
$45

Equipment needed:

• Notebook
• Portable Hard Drive (250mb or higher) [flash drives not recommended]
• Drop Box Account [http://www.dropbox.com/] (or equivalent)

Course Outcomes:
Students will develop concepts from completed storyboards in an animation/simulation productions from beginning to end. Their concepts will be sketched on storyboards and their production flow will be documented in a conceptual paper that defines the your respective approach. High quality storyboards and papers must be completed before the beginning of your projects.

The learning objectives of this course include the following:
1. Modeling, Texturing, Lighting of 3D Characters and Creatures
2. Introduction to Rigging and Animation of 3D Characters and Creatures

Core Competencies:
The core competencies of this course include the following:

1. Students will have the ability to perform advanced rigging, animation, gesture, emotional, and facial techniques within a digital character.
2. Students will explore the use of the 12 principles of animation throughout the course.
3. Students will learn 3D procedures that work across all 3D software platforms.
4. Students will deliver production and portfolio quality simulations that deliver advanced aesthetics, and mastery of 3D production workflow. High quality work will be expected.
5. Students will have the ability to deliver Cinematic, Gaming and VFX quality animations, simulations, based upon their industry of interest.

6. Students will have the ability to execute advanced visual effects animation such as particles, cloth, hair, and fluids.

**Software used:**

Autodesk Maya (most recent version) available at [http://students.autodesk.com/](http://students.autodesk.com/)
Adobe Production Suite

**EXPECTATIONS, GUIDELINES, AND POLICIES**

**Attendance:**

For success in this class students are expected to attend each class session. Missed classes are only allowed if notice is given a full week in advance. This class has a stringent attendance policy of 1 dropped letter grade for each 2 classes missed. I will take attendance at the beginning of each class.

**Incomplete:**

The instructor may assign an Incomplete (I) grade only if at least 75% of the required coursework has been completed at passing quality and holding you to previously established time limits would result in unjust hardship to you. All unfinished work must be completed by the date set by the instructor. Left unchanged, an Incomplete automatically becomes an F after one year. [http://registrar.iupui.edu/incomp.html](http://registrar.iupui.edu/incomp.html)

**Deliverables:**

You are responsible for completing each deliverable (e.g., assignment, quiz) by its deadline and submitting it by the specified method. Deadlines are outlined in the syllabus or in supplementary documents accessible through OnCourse. Should you miss a class, you are still responsible for completing the deliverable and for finding out what was covered in class, including any new or modified deliverable. In fairness to the instructor and students who completed their work on time, no grade will be given on a deliverable, if it is submitted late, the material will still be reviewed and/or critiqued.

**Exams/quizzes:**

There are no exams or quizzes

**Lab assignments:**

Class tutorials and demos must be completed along with the instructor. Failure to do so can result in a detrimental effect on overall quality of work and trend in lower scores.

**Class assignments:**
Class assignments/projects are expected to be finished and handed in on time. If you can’t get in an assignment before class, email it to me, upload and message it via OnCourse.

Final projects will not be accepted late.

**Grading Information:**

- Projects, papers, Class Participation determine grades weekly
- Professionalism is graded over the entirety of the course and includes participation (attitude, in-class critiques and questions, on-time deliverable(s). presentation quality)
- Grades will be returned along with critique no later than 2 weeks after assignment turn in.

**Principles of Undergraduate Learning (PUL):**

Learning outcomes are assessed in the following areas:

- Oral presentation (OP) (OP, CT, AoK, ID)
- Writing skills (WS)
- Critical thinking (CT)
- Application of knowledge (AoK)
- Intellectual depth, breadth, and adaptiveness (ID)
- Understanding of society and culture (S&C)
- Values and ethics (V&E)

**WEEKLY SCHEDULE**

**Date for each class meeting:**

- Specific pre-class readings
- Specific subject matter/topics covered
- Goals and objectives of each class period

**Tentative Weekly Outline (based on class progress)**

**Week 1**

- Introduction to class: syllabus
  - View prior class projects
  - Siggraph 2013
  - Projects Overview – team based projects or individual
  - LECTURE – Animation Pipeline – Rigs, Reference, Animation
  - LAB – Maya, Simple Rigs and Blocked Animation
ASSIGNMENT – Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses.

Week 2
LECTURE – Parenting, Grouping, Joint, FK/IK Animation, Skinning Geometry
Principles of Animation
LAB – Simple Rigs, Blocked, and Blocking Plus Animation

ASSIGNMENT - Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, incorporate Appropriate Staging, Follow through, anticipation, and any secondary action.

Add to joints, IK’s, and practice skinning your character

Week 3
LECTURE – Constraints, Set Driven Keys and Application, Clever Parenting and Grouping, review Skinning
- Introduce Curve editor, viewing/refining data
LAB –
ASSIGNMENT – Implement constraints and set driven keys into rigs, re-skin

Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, Incorporate Appropriate Staging, Follow through, anticipation, and any secondary action, Arcs, and Exaggeration this week.

Begin reference gathering and setup of stylistic character performance, body movement only

Week 4
LECTURE – review a few rigs, Introduce Blend Shapes, Eye Rigs, and corrective Blend Shapes
LAB
ASSIGNMENT Implement blend shapes, eye rigs, and corrective blend shapes, re-skin/edit skinning

Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, Incorporate
Appropriate Staging, Follow through, anticipation, and any secondary action, Arcs, and Exaggeration this week.

Continue reference gathering and setup of stylistic character performance, body movement only, begin creating thumbnails and acting out a 6 second performance

Week 5
LECTURE – Introduce Influence Objects, Joint Facial Rigging, GUI Set-Ups, Global Scalable RIG Set Ups
LAB
ASSIGNMENT - Implement Influence objects, Joint Facial Rigs, and/or Facial GUI

Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, Incorporate Appropriate Staging, Follow through, anticipation, and any secondary action, Arcs, and Exaggeration this week.

Begin stylistic character performance, body movement only, refine thumbnails and begin blocking and acting out a 6 second performance in Maya

Week 6
LECTURE - Review Rigs, Refine and polish, review animation planning and blocking
LAB
ASSIGNMENT –

Refine RIG, and anything you would like to add

Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, incorporate All Animation Principles.

Continue stylistic character performance, body movement only, begin blocking plus and acting out a 6 second performance in Maya

Week 7
LECTURE – Work day, Continue to Block and Block plus body performances.
LAB
ASSIGNMENT

Refine RIG, and anything you would like to add

Draw out 6 main poses of a 3 second animation then Block 72 frames of animation using at least 6 strong poses, Refine in between poses totaling 12 poses, Incorporate All Animation Principles

Continue stylistic character performance, body movement only, refine blocking plus and acting out a 6 second performance in Maya

Week 8
LECTURE – review first set of Animations from several weeks, introduce splining and refining phases of animation
LAB

ASSIGNMENT - Character Walk Cycle –
Draw out main poses of a loop able walk cycle animation then Block, and refine the frames of animation Incorporate All Animation Principles

Week 9
LECTURE - review first set of Animations from several weeks, introduce splining and refining phases of animation, Introduce animation layers
LAB
ASSIGNMENT – Nontraditional Walk Cycle – Draw out main poses of a loop able walk cycle animation then Block, and refine the frames of animation Incorporate All Animation Principles

Week 10
LECTURE - Character Emotional Animation, Psychology of the face, Anatomy, Emotions and Physiology

LAB –
ASSIGNMENT – Facial Performance - Draw out and act out main action of an emotional clip of audio, then Block, and refine the frames of animation Incorporate All Animation Principles
Week 11

LECTURE – review current facial animations
LAB
ASSIGNMENT - Facial Performance - Draw out and act out main action of an emotional clip of audio, then Block, and refine, and polish the frames of animation
Incorporate All Animation Principles

Week 12

LECTURE – Scripts, Cheats, and Best Practices, GUEST SPEAKER
LAB
ASSIGNMENT

Begin Final Performance Planning, thumbnail, record, and gather reference for the final 11 second animation, begin blocking phases

Week 13

LECTURE – Review Animations, Introduction to Dynamics
LAB
ASSIGNMENT

Facial Animation

Week 14

LECTURE – Continue Dynamics discussion by request, MOCAP Implementation
LAB
ASSIGNMENT

Final Performance Animation, continue blocking phases, move into blocking plus

Week 15 -
LECTURE Continue Dynamics discussion by request, MOCAP Implementation
LAB
ASSIGNMENT

Final Performance Animation, continue refining and polishing animation

Week 16

8
Present final Animation in play blast/render include audio from performance.

**Tentative Assignments**

<table>
<thead>
<tr>
<th>Assignment #</th>
<th>Due Date</th>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment #1</td>
<td>Week#2</td>
<td>Thumb nailing and blocking (CT, AoK, ID)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #2</td>
<td>Week#3</td>
<td>Start rig, Thumb nailing and blocking (CT, AoK, ID)</td>
<td>50</td>
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<tr>
<td>Assignment #3</td>
<td>Week#4</td>
<td>Cont rig, Thumb nailing and blocking, Planning midterm animation (CT, AoK, ID)</td>
<td>50</td>
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<tr>
<td>Assignment 4</td>
<td>Week#5</td>
<td>Cont rig, Thumb nailing and blocking, cont midterm animation (CT, AoK, ID)</td>
<td>50</td>
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<tr>
<td>Assignment #5</td>
<td>Week#6</td>
<td>Cont rig, Thumb nailing and blocking, cont midterm animation (CT, AoK, ID)</td>
<td>50</td>
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<tr>
<td>Assignment #6</td>
<td>Week#7</td>
<td>Cont rig, Thumb nailing and blocking, cont midterm animation (CT, AoK, ID)</td>
<td>50</td>
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<tr>
<td>Assignment #7</td>
<td>Week#8</td>
<td>Finish RIG and 1st Final Animation (CT, AoK)</td>
<td>200</td>
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<tr>
<td>Assignment #8</td>
<td>Week#9</td>
<td>Walk Cycle (CT, AoK)</td>
<td>50</td>
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<tr>
<td>Assignment #9</td>
<td>Week#10</td>
<td>Non-traditional Walk Cycle (CT, AoK)</td>
<td>50</td>
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<tr>
<td>Assignment #10</td>
<td>Week#11</td>
<td>Facial Performance #1 (CT, AoK)</td>
<td>50</td>
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<tr>
<td>Assignment #11</td>
<td>Week#12</td>
<td>Facial Performance #2 (CT, AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #12</td>
<td>Week#13</td>
<td>Plan and begin final animation (CT, AoK, ID)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #14</td>
<td>Week#14</td>
<td>Cont. Final Animation (CT, AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #14</td>
<td>Week #15</td>
<td>Cont. Final Animation (CT, AoK)</td>
<td>50</td>
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<tr>
<td><strong>FINAL</strong></td>
<td>Week#16</td>
<td>Present Final Animation (OP, CT, AoK, ID)</td>
<td>300</td>
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<tr>
<td><strong>Professionalism</strong></td>
<td>Week 16</td>
<td>Overall attendance, effort, communication (OP, CT, ID)</td>
<td>100</td>
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Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>100%</td>
<td>Professional level work, showing highest level of achievement</td>
</tr>
<tr>
<td>A</td>
<td>93–99%</td>
<td>Extraordinarily high achievement, quality of work; shows command of the subject matter</td>
</tr>
<tr>
<td>A−</td>
<td>90–92%</td>
<td>Excellent and thorough knowledge of the subject matter</td>
</tr>
<tr>
<td>B+</td>
<td>87–89%</td>
<td>Above average understanding of material and quality of work</td>
</tr>
<tr>
<td>B</td>
<td>83–86%</td>
<td>Mastery and fulfillment of all course requirements; good, acceptable work</td>
</tr>
<tr>
<td>B−</td>
<td>80–82%</td>
<td>Satisfactory quality of work</td>
</tr>
<tr>
<td>C+</td>
<td>77–79%</td>
<td>Minimally acceptable performance and quality of work</td>
</tr>
<tr>
<td>C</td>
<td>73–76%</td>
<td>Unacceptable work, does not demonstrate mastery</td>
</tr>
<tr>
<td>C−</td>
<td>70–72%</td>
<td>Unacceptable work</td>
</tr>
<tr>
<td>D+</td>
<td>67–69%</td>
<td>Unacceptable work</td>
</tr>
<tr>
<td>D</td>
<td>63–66%</td>
<td>Unacceptable work</td>
</tr>
<tr>
<td>D−</td>
<td>60–62%</td>
<td>Unacceptable work</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
<td>Failure</td>
</tr>
</tbody>
</table>

MISSION STATEMENT

The Mission of IUPUI is to provide for its constituents excellence in

- Teaching and Learning;
- Research, Scholarship, and Creative Activity; and
- Civic Engagement.

With each of these core activities characterized by

- Collaboration within and across disciplines and with the community;
- A commitment to ensuring diversity; and
- Pursuit of best practices.

IUPUI’s mission is derived from and aligned with the principal components—Communities of Learning, Responsibilities of Excellence, Accountability and Best Practices—of Indiana University’s Strategic Directions Charter.
STATEMENT OF VALUES

IUPUI values the commitment of students to learning; of faculty to the highest standards of teaching, scholarship, and service; and of staff to the highest standards of service. IUPUI recognizes students as partners in learning. IUPUI values the opportunities afforded by its location in Indiana’s capital city and is committed to serving the needs of its community. Thus, IUPUI students, faculty, and staff are involved in the community, both to provide educational programs and patient care and to apply learning to community needs through service. As a leader in fostering collaborative relationships, IUPUI values collegiality, cooperation, creativity, innovation, and entrepreneurship as well as honesty, integrity, and support for open inquiry and dissemination of findings. IUPUI is committed to the personal and professional development of its students, faculty, and staff and to continuous improvement of its programs and services.

CODE OF CONDUCT

All students should aspire to the highest standards of academic integrity. Using another student’s work on an assignment, cheating on a test, not quoting or citing references correctly, or any other form of dishonesty or plagiarism shall result in a grade of zero on the item and possibly an F in the course. Incidences of academic misconduct shall be referred to the Department Chair and repeated violations shall result in dismissal from the program.

All students are responsible for reading, understanding, and applying the Code of Student Rights, Responsibilities and Conduct and in particular the section on academic misconduct. Refer to The Code > Responsibilities > Academic Misconduct at http://www.indiana.edu/~code/. All students must also successfully complete the Indiana University Department of Education “How to Recognize Plagiarism” Tutorial and Test. https://www.indiana.edu/~istd You must document the difference between your writing and that of others. Use quotation marks in addition to a citation, page number, and reference whenever writing someone else’s words (e.g., following the Publication Manual of the American Psychological Association). To detect plagiarism instructors apply a range of methods, including Turnitin.com. http://www.ulib.iupui.edu/libinfo/turnitin

Academic Misconduct:

1. **Cheating:** Cheating is considered to be an attempt to use or provide unauthorized assistance, materials, information, or study aids in any form and in any academic exercise or environment.
   
a. A student must not use external assistance on any “in-class” or “take-home” examination, unless the instructor specifically has authorized external assistance. This prohibition includes, but is not limited to, the use of tutors, books, notes, calculators, computers, and wireless communication devices.

b. A student must not use another person as a substitute in the taking of an examination or quiz, nor allow other persons to conduct research or to prepare work, without advanced authorization from the instructor to whom the work is being submitted.
c. A student must not use materials from a commercial term paper company, files of papers prepared by other persons, or submit documents found on the Internet.
d. A student must not collaborate with other persons on a particular project and submit a copy of a written report that is represented explicitly or implicitly as the student’s individual work.
e. A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.
f. A student must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.
g. A student must not submit substantial portions of the same academic work for credit or honors more than once without permission of the instructor or program to whom the work is being submitted.
h. A student must not, without authorization, alter a grade or score in any way, nor alter answers on a returned exam or assignment for credit.

2. Fabrication: A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citation to the sources of information.

3. Plagiarism: Plagiarism is defined as presenting someone else’s work, including the work of other students, as one’s own. Any ideas or materials taken from another source for either written or oral use must be fully acknowledged, unless the information is common knowledge. What is considered “common knowledge” may differ from course to course.
   a. A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.
   b. A student must give credit to the originality of others and acknowledge indebtedness whenever:
      1. directly quoting another person’s actual words, whether oral or written;
      2. using another person’s ideas, opinions, or theories;
      3. paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
      4. borrowing facts, statistics, or illustrative material; or
      5. offering materials assembled or collected by others in the form of projects or collections without acknowledgment

4. Interference: A student must not steal, change, destroy, or impede another student’s work, nor should the student unjustly attempt, through a bribe, a promise of favors or threats, to affect any student’s grade or the evaluation of academic performance. Impeding another student’s work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain.

5. Violation of Course Rules: A student must not violate course rules established by a department, the course syllabus, verbal or written instructions, or the course materials that are rationally related to the content of the course or to the enhancement of the
learning process in the course.

6. **Facilitating Academic Dishonesty**: A student must not intentionally or knowingly help or attempt to help another student to commit an act of academic misconduct, nor allow another student to use his or her work or resources to commit an act of misconduct.

**OTHER POLICIES**

1. **IUPUI course policies**: A number of campus policies governing IUPUI courses may be found at the following link: [http://registrar.iupui.edu/course_policies.html](http://registrar.iupui.edu/course_policies.html)

2. **Classroom civility**: To maintain an effective and inclusive learning environment, it is important to be an attentive and respectful participant in lectures, discussions, group work, and other classroom exercises. Thus, unnecessary disruptions should be avoided, such as ringing cell phones, engagement in private conversations and other unrelated activities. Texting, surfing the Internet, and posting to Facebook or Twitter during class are generally not permitted. IUPUI nurtures and promotes “a campus climate that seeks, values, and cultivates diversity in all of its forms and that provides conditions necessary for all campus community members to feel welcomed, supported, included, and valued” (IUPUI Strategic Initiative 9). IUPUI prohibits “discrimination against anyone for reasons of race, color, religion, national origin, sex, sexual orientation, marital status, age, disability, or [veteran] status” (Office of Equal Opportunity). Profanity or derogatory comments about the instructor, fellow students, invited speakers or other classroom visitors, or any members of the campus community shall not be tolerated. A violation of this rule shall result in a warning and, if the offense continues, possible disciplinary action.

3. **Bringing children to class**: To ensure an effective learning environment, children are not permitted to attend class with their parents, guardians, or childcare providers.

4. **Disabilities Policy**: In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to reasonable accommodations. Please notify the instructor during the first week of class of accommodations needed for the course. Students requiring accommodations because of a disability must register with Adaptive Educational Services (AES) and complete the appropriate AES-issued before receiving accommodations. The AES office is located at UC 100, Taylor Hall (Email: [aes@iupui.edu](mailto:aes@iupui.edu), Tel. 317 274-3241). Visit [http://aes.iupui.edu](http://aes.iupui.edu) for more information.

5. **Administrative Withdrawal**: A basic requirement of this course is that students participate in all class discussions and conscientiously complete all required course activities and/or assignments. If a student is unable to attend, participate in, or complete an assignment on time, it is the student’s responsibility to inform the instructor. If a student misses more than half of the required activities within the first 25% of the course without contacting the instructor, the student may be administratively withdrawn from this course. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will
take place after the full refund period, and a student who has been administratively withdrawn from a course is ineligible for a tuition refund. Contact the instructor with questions concerning administrative withdrawal.