N342
3D Animation

Department of Media Arts and Science / Human-Centered Computing / Indiana University School of Informatics and Computing, Indianapolis Spring 2014

Section No.: 25708  Credit Hours: 3
Time: Mondays 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-N342-25708

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)

Prerequisites: NEWM-N 243

COURSE DESCRIPTION

An advanced class in working with computer animation, character development and visualization. A class to take basics of computer animation to an advanced level by including character development, modeling, texturing, rigging and animation. Advanced course focusing on the creation of high-end, broadcast quality animations. This course covers advanced modeling techniques used for building a three-dimensional character. Students will explore techniques of character modeling to include various approaches to figure construction. Other topics covered include research/planning, marketing, preproduction, production and postproduction.
Recommended Text(s):

Zbrush Character Creation: Advanced Digital Sculpting
Scott Spencer
**Publisher:** Sybex; 2 edition (February 8, 2011)
**ISBN-10:** 0470572574
**ISBN-13:** 978-0470572573

Stop Staring: Facial Modeling and Animation done right
Jason Osipa
**Publisher:** Sybex, 3 edition, 2010
**ISBN-10:** 0470609907
**ISBN-13:** 978-0470609903

Additional Readings: (if required)
Additional texts

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 2 photorealistic objects, and display them appropriately for their intended industry. 1 will be a believable human, the other a believable creature. Students will concept their proposals using traditional conceptual art techniques and reference gathered from real world.

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 develop, discuss, and implement from preproduction, to production, to post production of organic creatures and characters for film, video-game, or augmented-reality industry use.
2. Students will have the skills to model, texture, articulate, and render for low resolution or high resolution dependent industries.

3. Students will set-up creatures and characters for animation for film quality animation.

4. Students will create at minimum of a posed, and articulated moment of the creature/character for display in turntable for a production reel.

5. Students will learn entire production pipeline for using characters within a full 3D film composite production or fully CG production.

6. Students will have two complete ready-for-animation projects in the forms of a human, and a creature inspired from life.

7. Students will have the ability to deliver gaming and environmental projects, film and short story projects and scientific simulation productions.

**Software used:**

- Autodesk Maya (most recent version) available at [http://students.autodesk.com/](http://students.autodesk.com/)
- Zbrush 4.5 or higher
- Headus UV Layout
- 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)
• 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
- View prior class projects
- Siggraph 2013/CGTalk/3D websites

Final Project Details
- Create your own character and creature
- Use Joints, Ik/FK kinematics, influence objects for pose

Lecture: Review Zbrush Interface, and Dynamesh
Lab: Project Setup, discussion and inquiry.

Assignment:
(1) Create your own character and creature concept art to use for the semester.
(2) Research Assignment: Locate 3 top 3D modelers online, document their work, process, and how they got into the trade.

Week 2:

Lecture: Modeling via Reference, topology planning
- Overview of fundamentals in modeling Polygons
- Edge Looping and Topology Instruction

Lab: Discuss kinesiology, and how edge-loops assist in animation for different industries

Assignment: Make 4k maximum base mesh of character/creature

Week 3:

Lecture: - Edge Looping and Topology Instruction / Anatomy Checks
- Modeling Edge Loops for facial structures, hand and feet

Lab: - Review Anatomy of student projects

Assignment: Refine model based on critiques

Week 4:

Lecture: - Unwrapping techniques in UV Layout for Photoshop and Zbrush
- Unwrapping Techniques versus Maya
- Maya and Zbrush Workflow Theories

Lab: - UVLayout Demo

Assignment: Milestone #1 Due Week #5

Week 5:

Lecture: Zbrush Interface and Sculpting Techniques
Lab: 3, 30 minute Sculpting sessions

Assignment: Model accessories, unwrap, prep for zbrush

Week 6:

Lecture: Using Subobjects, checking anatomy, using reference
zDynamesh to test ideas, using alphas for sculpting, Asymmetry
Lab: Discuss Object Creation, and requirements for use in Maya
Assignment: Level 3-4 sculpt on all objects

Week 7:
Lecture: Instruction on wrinkles, pores, scars,
Continue with character by adding in wrinkles, pores, scars, etc utilizing alpha maps and advanced techniques
Lab: Begin finalizing sculpt and showcasing Polypainting
Assignment: Level 6-7 sculpt on all objects

Week 8:
Lecture: Texturing in Zbrush using polypaint and/or Spotlight
Lab: Demo on Creature/Character
Assignment: Texture character and creature

Week 9:
Finalizing for Animation from Zbrush
- Texturing in Zbrush for import back into Maya
- Exporting/applying Vector Displacement/ Normal Maps Zbrush to Maya
Lab: Work on Character model for Final
Assignment: Milestone #2 Due Week #10

Week 10:
Lecture: Rigging Techniques
Applying Bones, CTRL shapes to pose your character for Maya
Lab: Demo Joints, IK, FK, and SPLINE IK Uses
Assignment: Create joint system, IK, and Spine IK for models

Week 11:
Lecture: Rigging Techniques
Blend Shapes and Influence Objects for posing in Maya, Skinning Geometry
Lab: Demo Blend Shapes versus Influence Objects and Paint Weights
Assignment: Create blend shapes and/or influence objects for models

Week 12:
Lecture: Rigging Techniques
Skinning Geometry, Wrapping Geometry, Rigid Bodies, Ncloth
Lab: Show WEight Painting
Assignment: Milestone #3 due Week #13

Week 13:
Lecture: Rendering Techniques
Applying Gamma Correction and Lighting Setup for Compositing
Lab: Demo Gamma Correction, SSS implementation, Passes Setup
Assignment:

Week 14:
Lecture: Rendering Techniques
Compositing and Enhancing Turntable for Character Reels
Lab: Work on setting up Render layers and Passes

Week 15:
Lab: WorkDay
Assignment:

Week 16:
Present Final Project and Turntables.

**Tentative Assignments**

<table>
<thead>
<tr>
<th>Assignment #1</th>
<th>Due Date</th>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment #1</td>
<td>Week#2</td>
<td>Conceptual Art, Research 3 Character Artists (CT, AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #2</td>
<td>Week#3</td>
<td>4k base mesh #1 (AoK)</td>
<td>50</td>
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<tr>
<td>Assignment #3</td>
<td>Week#4</td>
<td>Refined Base Mesh (AoK)</td>
<td>50</td>
</tr>
<tr>
<td><strong>Milestone #1</strong></td>
<td>Week#5</td>
<td>Unwrapped .obj ready for Zbrush (AoK)</td>
<td>100</td>
</tr>
<tr>
<td>Assignment #5</td>
<td>Week#6</td>
<td>Model accessories, unwrap, prep for ZBrush, practice sculpts (AoK, ID)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #6</td>
<td>Week#7</td>
<td>Level 3-4 sculpt on all objects (AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #7</td>
<td>Week#8</td>
<td>Refine sculpts to level 6-7 (AoK)</td>
<td>50</td>
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<tr>
<td>Assignment #8</td>
<td>Week#9</td>
<td>Texture character and creature (AoK)</td>
<td>50</td>
</tr>
<tr>
<td><strong>Milestone #2</strong></td>
<td>Week#10</td>
<td>Export textures, prep for Maya (AoK)</td>
<td>100</td>
</tr>
<tr>
<td>Assignment #9</td>
<td>Week#11</td>
<td>Create joint system, IK, and Spine IK for models (AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #10</td>
<td>Week#12</td>
<td>Create blend shapes and/or influence objects for models (AoK)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment #10</td>
<td>Week#13</td>
<td>Skin Character, incorporate other</td>
<td>50</td>
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</tbody>
</table>
geometry into rig, including dynamics (AoK)

<table>
<thead>
<tr>
<th>Milestone #3</th>
<th>Week#15</th>
<th>Render tests ready to evaluate (AoK)</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINAL</td>
<td>Week#16</td>
<td>Turntable, animated pose, full composite for each model (OP, Aok, ID)</td>
<td>300</td>
</tr>
<tr>
<td>Professionalism</td>
<td>Week 16</td>
<td>Overall attendance, effort, communication</td>
<td>100</td>
</tr>
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**Grading Scale:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
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</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>
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**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, 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.