

**NEWM N339
Augmented Reality Design and Development**

**Department of Human-Centered Computing
Indiana University School of Informatics and Computing, Indianapolis
Fall 2015**

Section No.: *Credit Hours:* 3
Day/Time:
Location: IT 255, Informatics & Communications Technology Complex
535 West Michigan Street, Indianapolis, IN 46202 [\[map\]](#)
First Class:
Instructor: Zebulun M. Wood, MS in Technology, Lecturer
Office Hours:
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 N220 Introduction to Media Application Development](#) and
[NEWM N243 Introduction to 3D](#)

COURSE DESCRIPTION:

This course covers the design and development of computer games and simulations for augmented and virtual reality. To supplement and simulate the physical world, students learn methods for integrating 3D objects and animations into interactive mobile applications. They also propose new, disruptive applications in entertainment, education, and other industries.

Required Text:

There are no required texts for this course.

Supplementary Text:

Author: Digital Tutors/Gnomon, 12-month membership, \$70

Equipment needed:

- Notebook
- Box Account [<http://www.box.iu.edu/>]

Software used:

Autodesk Maya 2014 or Higher
Zbrush 4r6 or higher
Unity / Unity Pro 5 (to author)

Course Objectives

Students create concepts from their own designs, test, and evaluate interactive experiences that augment traditional mobile technology. Their own concepts are critiqued and executed based on appropriate production flows while researching and documenting methods that define their respective approach. The planning, execution, and criticism of projects from peers engenders a high level of proficiency in evaluating, creating, and critiquing the development of augmented reality experiences and the costs associated with them.

Learning Objectives

Upon completion of this course, students will	RBT	PUL	Assessment
1. Model and animate 3D computer-generated objects, from preproduction to production to postproduction;	6	1A, 3	Assignments
2. Apply the entire production pipeline for the application of 3D media in augmented and virtual reality interfaces;	3	3	Milestone 1 and 2
3. Design and implement an interactive computer game, simulation, or tool to display and manipulate objects or data in 3D;	6	1B	Final Project
4. Propose novel, disruptive applications of augmented and virtual reality.	2	2	Assignments Presentation

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>

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 must 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.

Grads who are participating in the class will be expected to achieve exemplary results in all assignments, expected to lead in class critique, as well as participate in assisting in the class with undergrads. Often times, the successes and assignments that graduates are asked to do amplify the whole class.

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 days after assignment turn in.

WEEKLY SCHEDULE

Week 1:

Introduction: Syllabus, Student & Instructor Introductions,
Student Knowledge Inventory

Lecture: Equipment/Software Introduction
Go over Resources, discuss current market

Lab: Go ideas student wants to do, and hardware they are working with
at home

Assignment: Research and Ideate field AR can enhance, discuss prototype project

Week 2 Tuesday:

Lecture: Introduce AR in action,

Lab: Review interfaces of Both Maya and AR, do another full pipeline demo

Assignment: Work on art assets and code to develop simple AR interaction

Week 2 Thursday:

Lecture:

Lab: Finish AR implementation

Assignment: Prove you know pipeline with a full unity build in class

Week 3 Tuesday: Field Trip possibility

Milestone 1: Pitch final project ideas(s), one business proof of concept and one entertainment proof of concept

Week 3 Thursday: Field Trip possibility

Milestone 1: Pitch final project Ideas(s), one business proof of concept + one entertainment proof of concept

Week 4a Tuesday: Review pitches

Lecture: Using textures and lighting in AR

Assignment: Deliver updates on projects

Week 4b Thursday

Lecture: Using Rigs and Animation in AR

Lab: Work in Class

Assignment: Deliver updates on projects

Week 5a Tuesday

Lecture: Developing AR Interaction, buttons, animations, audio, etc.

Lab: Work in Class

Assignment: Deliver updates on projects

Week 5b Thursday

Lecture: Developing AR Interaction, buttons, animations, audio, etc.

Lab: Work in Class

Milestone 2: Deliver updates presentation on projects

Week 6a Tuesday

Lecture: Review interactions and media implementations

Lab: Work in Class

Assignment: Deliver final updates on projects

Week 6b Thursday

Lecture: Last minute demos

Lab: Authoring for Mobile Devices

Assignment: finish and prep model for presentation

Week 7: Present Final Apps and interactions on devices

Grading Information:

Weekly Assignments

All assignments are to be delivered in a folder with your name, class , and week titled, if the assignment is Maya based ; with zipped Maya project folders, and will be evaluated through Oncourse within the week.

Each weekly assignment is *worth 50 points each*.

Weekly assignments will consist of testing your prototypes of your application at various stages, with various groups, and reporting your findings both in presentation and written reports.

Milestones

Milestones are key points in the course in which students will be asked to generate their own technical solutions, present research and methods to one another as well as critique and analyze each other's methods from work over weeks.

- **Milestone 1** is a preliminary check on pipeline and understanding of using 3D design principles, and integrating assets in Unity. *Worth 100 pts*
 - This project is very dependent on your evaluation, planning, and execution of techniques in and outside of class to create an Augmented Reality App that is easy to use and understand. Productions often are thrown hurdles and delays; you will be responsible for hitting deadline and planning for these moments, while presenting your methods.

- **Milestone 2** is a secondary check on pipeline and understanding of using 3D design principles, user testing, reporting, integrating assets in Unity, and publishing your app to device. *Worth 100 pts*
 - This project is very dependent on your evaluation, planning, and execution of techniques in and outside of class to create an Augmented Reality App that is easy to use and understand. Productions often are thrown hurdles and delays; you will be responsible for hitting deadline and planning for these moments, while presenting your methods, research on user testing your app, and plans to refine your experience.

Final Project Milestone

This is your final, in APP, this can be a highly detailed single object, an object or objects the user can interact and learn from, or something completely new

- 100 points towards asset level detail, quality, and efficiency
- 100 degree of difficulty, sell-ability of project
- 100 points for display of final product

Tentative Assignments

	<i>Due Date</i>	<i>Assignment</i>	<i>Points</i>
Assignment 1	Week2a	Bring in Models that you have already	50
Assignment 2	Week2b	Deliver research and proposal for final project	50
Assignment 3	Week3a	Deliver Method for testing and completing interaction, include what you will research	50
Milestone 1	Week3b	Proof of Concept	100
Assignment 5	Week4a	Finalize geometry	50
Assignment 6	Week4b	Unwrap Geometry	50
Assignment 7	Week5a	Finalize Rig or other assets , Test interactions and development in Unity	50
Milestone 2	Week5b	Prep rig for animation or motion capture data, Test interactions and development in Unity	100
Assignment 8	Week6a	Test interactions and development in Unity	50
Assignment 9	Week6b	Export/Implement all assets and animations to test interactions and development in Unity	50
Final Presentation of Project & Research	Week7	Delivery of final product/ files	300
Total			900

Grading Scale:

A+	97 – 100	Outstanding achievement, given at the instructor’s discretion
A	93 – 100	Excellent achievement
A–	90 – 092.99	Very good performance and quality of work
B+	87 – 089.99	Good performance and quality of work
B	83 – 086.99	Modestly acceptable performance and quality of work
B–	80 – 082.99	Marginal acceptable performance and quality of work
C+	77 – 079.99	Unacceptable work (Core course must be repeated for credit)
C	73 – 076.99	Unacceptable work (Core course must be repeated for credit)
C–	70 – 072.99	Unacceptable work (Course must be repeated for credit)
D+	67 – 069.99	Unacceptable work (Course must be repeated for credit)
D	63 – 066.99	Unacceptable work (Course must be repeated for credit)
D–	60 – 062.99	Unacceptable work (Course must be repeated for credit)
F	Below 60	Unacceptable work (Course must be repeated for credit)

No credits toward major, minor, or certificate requirements are granted for a grade below B–.

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. **Right to revise:** The instructor reserves the right to make changes to this syllabus as necessary and, in such an event, will notify students of the changes immediately.
2. **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
3. **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. Cell phones, media players, or any noisy devices should be turned off during a class. Texting, surfing the Internet, and posting to Facebook or Twitter during class are generally not permitted. Laptop use may be permitted if it is used for taking notes or conducting class activities. Students should check with the instructor about permissible devices in class. 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.

4. **Bringing children to class:** To ensure an effective learning environment, children are not permitted to attend class with their parents, guardians, or childcare providers.
5. **Course Evaluations:** Course evaluations provide vital information for improving the quality of courses and programs. Students are urged to complete one course and instructor evaluation for each section in which they are enrolled at the School of Informatics and Computing with the following three exceptions: (a) The student has withdrawn from the course; (b) fewer than five students are enrolled in the section (in which case anonymity is impossible); and (c) the section is a laboratory that must be taken with a course having a different section number. Course evaluations are completed at <https://soic.iupui.edu/app/course-eval/>. Course evaluations are open from the eleventh week. Course evaluations are anonymous, which means that no one can view the name of the student completing the evaluation. In addition, no one can view the evaluation itself until after the instructor has submitted the final grades for the course. In small sections, demographic information should be left blank, if it could be used to identify the student.
6. **Communication:** For classroom-based courses, instructor or teaching assistant should respond to emails by the end of the next class or, for online courses, within two Indiana University working days, which excludes weekends and holidays. The instructor should provide weekly office hours or accept appointments for face-to-face, telephone, or teleconferenced meetings, and announce periods of extended absence in advance.
7. **Email:** Indiana University uses your IU email account as an official means of communication, and students should check it daily for pertinent information. Although you may have your IU email forwarded to an outside email account, please email faculty and staff from your IU email account.
8. **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> for more information.
9. **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.

10. **Emergency Preparedness:** Safety on campus is everyone's responsibility. Know what to do in an emergency so that you can protect yourself and others. For specific information, visit the emergency management website. <http://protect.iu.edu/emergency>
11. **Student Advocate:** The Student Advocate provides assistance to students with personal, financial, and academic issues. The Student Advocate Office is located in the Campus Center, Suite 350. The Student Advocate may also be contacted by phone at 317 274-4431 or by email at studvoc@iupui.edu. For more information visit <http://studentaffairs.iupui.edu/advocate>.
12. **Counseling and Psychological Services (CAPS):** Students seeking counseling or other psychological services should contact the CAPS office by phone at 274-2548 or email at capsindy@iupui.edu. For more information visit <http://life.iupui.edu/caps/>.

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.