



IUPUI

**SCHOOL OF INFORMATICS
AND COMPUTING**

DEPARTMENT OF HUMAN-CENTERED COMPUTING
Indiana University–Purdue University
Indianapolis

**NEWM N-585 Experiential Innovation I – Advanced
Visualization**

Department of Human-Centered Computing
Indiana University School of Informatics and Computing, Indianapolis
Spring 2020

Section No.: 26510

Credit Hours: 3

Time: Tuesdays 6:00pm -8:40pm

Location: IT 256 & Later in lab IT 403, Informatics & Communications Technology
Complex

535 West Michigan Street, Indianapolis, IN 46202 [[map](#)]

First Class: January 14th, 2020

Website: <https://canvas.iu.edu/>

Instructor: Chauncey E. Friend, M.S., Sr. Analyst/Programmer Advanced Visualization
Lab

Office Hours: By Appointment

Office: IT406 Advanced Visualization Lab, 535 W. Michigan Street, Indianapolis,
IN 46202 [[map](#)]

Phone: (574) 612-4537 (Cell)

Email: cfrend@iu.edu

Prerequisites: None

COURSE DESCRIPTION AND LEARNING OUTCOMES

This course will provide hands-on design and development experience in augmented reality (AR) and virtual reality (VR) technologies utilizing the UITS Advanced Visualization Lab (AVL) in the Informatics Complex. Students pursue the unique application of AR or VR media frameworks to seek solutions for real-world problems. This is an applied research

course where students will learn to direct their own search for innovation through implementation.

At the end of this course, students will be able to:

- Form innovative hypotheses for state-of-the-art research activities and/or commercial solutions.
- Adopt low complexity design tools for probing hypotheses and/or commercial prototypes.
- Lead technical discussions and presentations to gain feedback on design ideas.
- Develop and refine a research and development roadmap of milestones.
- Adopt high complexity tools to achieve short term scope milestones as well as considering long terms scope milestones.
- Write progressive technical documentation in pursuit of milestones.
- Develop self-reliance toward finding new knowledge and/or solving a real-world problem.

Course Objectives:

- Demonstrate effective academic writing skills
- Demonstrate a working knowledge of the design process
- Demonstrate reflective thinking skills in the design process using digital applications
- Engage in discussion on integral hard/soft technologies in MAS and HCI
- Analyze and present evaluative feedback on current digital media technology issues
- Engage in analysis of the “state-of-the-art.”
- Understand how to test and refine innovative design from discussion and debate.
- Develop a vision and a path using big picture thinking.
- Demonstrate how to break down big projects into smaller projects.
- Measure and define your own success towards new knowledge and/or innovation.

Core Competencies:

The core competencies of this course include:

- Research - analyze and present an effective design process using digital applications
- Using Digital Applications and the design process - demonstrate effective project management and digital design and development skills
- Demonstrate effective team-based communication and collaboration

Equipment needed:

- iOS or Android smartphone
- Mac or Windows Laptop
- <https://www.box.iu.edu> for file sharing

Software used:

- Google TiltBrush
- Photoshop
- Open Broadcaster Software
- Unity
- MS PowerPoint, Word
- Adobe Premiere Pro

Learning Outcomes:

Upon completion of this course, the student will	RBT*	PGPL	Assessment
1. Examine best-practice design and development methodologies in leading-edge AR and VR platforms.	3. Apply 4. Analyze	K&S CT EC	Project and Presentation
2. Develop AR and VR design skills with onboarding visualization tools.	5. Evaluate	K&S CT EC	Project and Presentation
3. Develop AR and VR C# programming skills with the Unity 3D game engine.	5. Evaluate	K&S CT EC	Project and Presentation
4. Gain experience with professional VR and AR systems. (Oculus Quest, HTC Vive, Microsoft HoloLens, IQ-Wall, and mobile device AR/VR platforms)	4. Analyze 5. Evaluate	K&S CT EC	Analysis and Presentation

5. Apply flexible planning techniques, progressive technical writing, and discussion in pursuit of a technology roadmap.	6. Create	K&S CT EC EB	Identify short and long term scope requirements, apply Project and Presentation
6. Present on development progress and adjust project direction based on feedback.	4. Analyze 5. Evaluate	K&S CT EC	Evaluate and adjust short and long term scope, apply Project and Presentation
7. Demonstrate persistent professional discipline in learning acute technology skills related to roadmap.	6. Create	CT EB	Project and Evaluation

*RBT: Revised Bloom's Taxonomy

Principles of Graduate and Professional Learning (PGPL)

Learning outcomes are assessed in the following areas:

1. Knowledge and skills mastery (K&S)
2. Critical thinking and good judgment (CT)
3. Effective communication (EC)
4. Ethical behavior (EB)

Grade Breakdown:

Attendance (15)	150
Participation: Class Discussions & Presentations	50
Written Innovator Progress Assignments (10)	100
Final Innovator Showcase	100
<i>Total Possible:</i>	<i>400</i>

Grading Scale:

A = 360 – 400 Excellent or very good achievement and quality of work

B = 316 – 359 Satisfactory achievement and quality of work

F = 0 – 315 Failure

Credit will not be given toward major, minor, or certificate requirements with a grade below B–

COURSE INFORMATION

This course explores a variety of industry topics, including

- Research and Discovery
- Plan Development
- Research and Development Roadmaps and Milestones
- Innovation and Commercialization
- Design and development accountability
- Presentation

Experiential technologies like VR or AR operate spatially in our three-dimensional world. Potential research and development topics may include examples like immersive health and wellness applications, immersive data analytics, haptics technology, 3D sentiment analysis, real-time spatial surveillance, immersive media capture and/or playback, remote work environments, environmental feedback technology, immersive online shopping, building information spatial visualization, real-time mechanical maintenance instruction, or even immersive STEM educational resources.

Weekly Schedule (Subject to Change)

Students will be notified of syllabus updates.

Date	Class Topic	Assignment Due
	<ul style="list-style-type: none"> • Course Introduction & Overview; • Innovator Insight video • Discussion 	
Week 1 1/14/20	<ul style="list-style-type: none"> • XR Industry & Innovator Introduction • Assignment Logistics • Innovator Topic Lecture • Individual skills discussion 	None

- Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
 - Assignment Logistics
 - Innovator Topic Lecture
 - The Innovator's "Home"
 - New tool showcase
 - Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
 - Assignment Logistics
 - Innovator Topic Lecture
 - Abstractions of tools and you.
 - New tool showcase
 - Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
 - Assignment Logistics
 - Innovator Topic Lecture
 - Considering innovation paths
 - New tool showcase
 - Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
 - Assignment Logistics
 - Innovator Topic Lecture
 - Innovator reasoning strategy
 - New tool showcase
- Small Steps Assignment
 - Your innovator notes kickoff assignment
 - TiltBrush sketch your favorite product innovation for your notes.
 - State of the art hypothesis research not assignment.

- Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
- Week 6 2/18
- Assignment Logistics
 - Innovator Topic Lecture
 - Sharpen the saw wisdom
 - New tool showcase
 - Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
- Week 7 2/25
- Assignment Logistics
 - Innovator Topic Lecture
 - Mining gems
 - New tool showcase
 - Innovator Insight video
 - Discussion
 - XR Industry & Innovation news
- Week 8 3/3
- Assignment Logistics
 - Innovator Topic Lecture
 - Power of Visualization
 - New tool showcase
- Your innovation idea assignment.
 - Skills learning research assignment.
 - Mining gems assignment.

- | | | |
|--------------|--|---|
| Week 9 3/10 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Innovator Topic Lecture <ul style="list-style-type: none"> ◦ Innovator's wisdom • New tool showcase | <ul style="list-style-type: none"> • Visualization assignment. • Innovation progress notes assignment. |
| Week 10 3/24 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Innovator Topic Lecture <ul style="list-style-type: none"> ◦ Fuel your perspective • New tool showcase | <ul style="list-style-type: none"> • Innovation progress notes assignment. |
| Week 11 3/31 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Innovator Topic Lecture <ul style="list-style-type: none"> ◦ You and everybody else • New tool showcase | <ul style="list-style-type: none"> • Personal innovator perspective assignment. • Innovation progress notes assignment. |

- | | | |
|--------------|--|---|
| Week 12 4/7 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Innovator Topic Lecture <ul style="list-style-type: none"> ◦ Integrity of the innovator • New tool showcase | <ul style="list-style-type: none"> • Innovation progress notes assignment. |
| Week 13 4/14 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Open Lab | <ul style="list-style-type: none"> • Innovation progress notes assignment. |
| Week 14 4/21 | <ul style="list-style-type: none"> • Innovator Insight video • Discussion • XR Industry & Innovation news • Assignment Logistics • Open Lab | <ul style="list-style-type: none"> • Innovation progress notes assignment. |
| Week 15 4/28 | <ul style="list-style-type: none"> • Innovator Showcase | <ul style="list-style-type: none"> • Innovation showcase assignment. |

Attendance:

A basic requirement of this course is that you will participate in all class meetings, whether online or face-to-face, and conscientiously complete all required course activities and assignments. Class attendance is required for classroom-based courses. It entails being present and attentive for the entire class period. Attendance shall be taken in every class. If you do not sign the attendance sheet while in class, you shall be marked absent. Signing the attendance sheet for another student is prohibited. The instructor is required to submit to the Registrar a record of student attendance, and action shall be taken if the record conveys a trend of absenteeism.

Only the following are acceptable excuses for absences: death in the immediate family (e.g. mother, father, spouse, child, or sibling), hospitalization or serious illness; jury duty; court ordered summons; religious holiday; university/school coordinated athletic or scholastic activities; an unanticipated event that would cause attendance to result in substantial hardship to one's self or immediate family. Absences must be explained with the submission of appropriate documentation to the satisfaction of the instructor, who will decide whether missed work may be made up. Absences that do not satisfy the above criteria are considered unexcused. To protect your privacy, doctor's excuses should exclude the nature of the condition and focus instead on how the condition impacts your attendance and academic performance.

Missing class reduces your grade through the following grade reduction policy: You are allowed two excused or unexcused absences. Each additional absence, unless excused, results in a 5% reduction in your final course grade. More than four absences result in an F in the course. Missing class may also reduce your grade by eliminating opportunities for class participation. For all absences, the student is responsible for all covered materials and assignments.

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 Canvas. 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, a grade on a deliverable shall be reduced 10%, if it is submitted late and a further 10% for each 24-hour period it is submitted after the deadline.

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:** ^[1]_{SEP} Cheating is an attempt to use or provide unauthorized assistance, materials, information, or study aids in any form and in any academic exercise or environment.
 1. 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.
 2. 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.
 3. 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.
 4. 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.
 5. A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.
 6. A student must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.
 7. 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.
 8. 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.

1. A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.
2. 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
3. **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 to deprive others of the information they contain.
4. **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.
5. **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. **Administrative withdrawal:** Students must 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, the student must 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 occurs after the full refund period, and a student who has been administratively withdrawn is ineligible for a tuition refund.
2. **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, web surfing, and posting to social media 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.

3. **Communication:** For classroom-based courses, the 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.
4. **Counseling and Psychological Services (CAPS):** Students seeking counseling or other psychological services should contact the CAPS office at 274-2548 or capsindy@iupui.edu. For more information visit <http://life.iupui.edu/caps/>.
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 exceptions: (a) The student has withdrawn from the course; (b) fewer than five students are enrolled in the section (in which case maintaining anonymity is difficult); 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 typically 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. In small sections, demographic information should be left blank, if it could be used to identify the student.
6. **Disabilities policy:** All qualified students enrolled in this course are entitled to reasonable accommodations for a disability. Notify the instructor during the first week of class of accommodations needed. Students requiring accommodations 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). For more information visit <http://aes.iupui.edu>.
7. **Email:** Indiana University uses your IU email account as an official means of communication, and students should check it daily. Although you may have your IU email forwarded to an outside email account, please email faculty and staff from your IU email account.

8. **Emergency preparedness:** Know what to do in an emergency so that you can protect yourself and others. For more information, visit the emergency management website at <http://protect.iu.edu/emergency>.
9. **IUPUI course policies:** Several campus policies governing IUPUI courses may be found at the following link: http://registrar.iupui.edu/course_policies.html
10. **No class attendance without enrollment.** Only those who are officially enrolled in this course may attend class unless enrolled as an auditor or making up an Incomplete by prior arrangement with the instructor. This policy does not apply to those assisting a student with a documented disability, serving in an instructional role, or administrative personnel. <http://registrar.iupui.edu/official-enrollment-class-attendance.html> Children may *not* attend class with their parents, guardians, or childcare providers.
11. **Religious holidays:** Students seeking accommodation for religious observances must submit a request form to the course instructor by the end of the second week of the semester. For information visit <http://registrar.iupui.edu/religious.html>.
12. **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.
13. **Sexual misconduct:** IU does not tolerate sexual harassment or violence. For more information and resources, visit <http://stopsexualviolence.iu.edu/>.
14. **Student advocate:** The Student Advocate assists students with personal, financial, and academic issues. The Student Advocate is in the Campus Center, Suite 350, and may also be contacted at 317 274-4431 or studvoc@iupui.edu. For more information visit <http://studentaffairs.iupui.edu/advocate>.

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.