NEWM N537
VIRTUAL WORLD DESIGN AND DEVELOPMENT

DEPARTMENT OF HUMAN-CENTERED COMPUTING, MEDIA ARTS AND SCIENCE PROGRAM
INDIANA UNIVERSITY SCHOOL OF INFORMATICS AND COMPUTING, INDIANAPOLIS
FALL 2016

Section No.: 33342  Credit Hours:  3
Time: M 6–8:40 pm
Location: IT 355
Instructor: Travis Faas, M.S., Ph.D. candidate
Office Hours: Wednesday, 1–4 pm, or by appointment
Office: IT 461
Email: tfaas@iupui.edu

Prerequisites: Prior programming experience
Students should be familiar with basic programming concepts, markup tags, and scripting.

COURSE DESCRIPTION
Students research factors influencing the design and implementation of online virtual worlds. They use their design knowledge and technical skills to create several small virtual world prototypes to explore potential uses of virtual worlds and effects of networked interaction on their inhabitants.

Required Text(s):


### Learning Outcomes:

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>RBT</th>
<th>PGPL</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upon completion of this course, students will</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Analyze a virtual world for motivational elements and engagement hooks</td>
<td>4</td>
<td>3</td>
<td>Reflection paper</td>
</tr>
<tr>
<td>2. Create a demo build of a virtual world to be use on nontraditional devices</td>
<td>6</td>
<td>1</td>
<td>Deploy multiplayer game to android device</td>
</tr>
<tr>
<td>3. Critique implementations of multiplayer games</td>
<td>5</td>
<td>2</td>
<td>Project Presentations</td>
</tr>
<tr>
<td>4. Recommend game systems and game elements to motivate different types of players</td>
<td>5</td>
<td>2</td>
<td>World Design</td>
</tr>
<tr>
<td>5. Rearrange elements of many different game examples to create a new working game</td>
<td>6</td>
<td>1</td>
<td>Final Project milestone 2</td>
</tr>
<tr>
<td>6. Compare and contrast the advantages and disadvantages of various world building techniques</td>
<td>4</td>
<td>2</td>
<td>Targeted audience worldspace</td>
</tr>
<tr>
<td>7. Summarize findings from a prototyping session</td>
<td>6</td>
<td>3</td>
<td>Final project milestone 1</td>
</tr>
<tr>
<td>8. Propose an intervention and measurement tool to help inform the design or modification of a virtual world.</td>
<td>6</td>
<td>2</td>
<td>Research Proposal</td>
</tr>
</tbody>
</table>

**RBT:** Revised Bloom's Taxonomy; **PGPL:** Principles of Graduate and Professional Learning

**Principles of Graduate and Professional Learning (PGPL)**

Learning outcomes are assessed in the following areas:

1. Knowledge and skills mastery **Major emphasis**
2. Critical thinking and good judgment **Minor emphasis**
3. Effective communication **Some emphasis**
4. Ethical behavior **Some emphasis**

**Software used:**
Unity3D, available here: http://unity3d.com/
**EXPECTATIONS, GUIDELINES, AND POLICIES**

**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 10% reduction in your final course grade. More than six 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.

No work accepted after due date.

Exams/quizzes
Expect quizzes weekly, along with midterm and final examinations.

Class assignments:
There will be a number assignments given to you to be completed outside of class. They will be designed to get you to apply your new skills with a challenging application. You are expected to work alone on these assignments.

Grading Information:
Quizzes 10%
Exercises 20%
Analysis paper 15%
Multiplayer project 15%
Persistent world 15%
Device project 15%
Research Proposal 10%

WEEKLY SCHEDULE

Week 1

Lecture  Introduction to the course, technical requirements. Definition of virtual worlds and a brief discussion of their past, present, and future.

Assignment 4 hours in a virtual world (Realm of the Mad God), and a reflection paper on the social structures you viewed in the game, along with what motivated you to play.

Outcome An understanding of the foundational elements of a virtual world both firsthand and via reflection.

Week 2

Lecture  A tour of the unity interface, with a focus on creating game objects, attaching scripts, and getting responses from user input.
Assignment  Finish the 2D roguelike tutorial on Unity’s tutorial page

Outcome  Familiarization with the Unity interface and competency established in creating 2D games using a system that can be used as a basis for later virtual worlds.

Week 3

Lecture  Discussion of networking fundamentals, and their implementation in Unity. A lab section dedicated to producing a networked shared 2D space (Walk and Talk application)

Assignment  Complete and refine the walk and talk application, a lab started in class.

Outcome  First exposure to Unity networking code, establish capability to create networked movement and cross-client communication.

Week 4

Lecture  An in depth look at different server architectures, and the primary implementation in Unity.

Assignment  Create a world space that triggers changes in client machines based on player’s positions inside the server’s simulation. At least three changes, only one of which can be physics based.

Outcome  Understand and implement an authoritative server architecture inside of Unity. Explain why authoritative servers are necessary for fair games.

Week 5

Lecture  An examination of the programming of a client machine that communicates its state with the server and how the client makes requests of the server.

Assignment  Implement doors, keys, and client instantiated objects into a game space in the form of a multiplayer shooter.

Outcome  Implement and master the process of manually requesting a response from the unity server.

Week 6

Lecture  Examining how to destroy objects in the server, have the server make game wide decisions, and break large games up into smaller ones.
Assignment: Take a multiplayer shooter game and add to it multiple rooms, a login system, and the ability to have the players respawned by bullet shots.

Outcome: Master the ability to create custom server code that can be used to add new rules to a game system.

Week 7

Lecture: A discussion of data types and storage options used by virtual worlds, and specifically the ones Unity can use.

Assignment: Create a login system that forces players to register before playing the game and to login for each game session. Allow players to choose unique avatars to represent themselves in the game.

Outcome: Exposure to the concepts of saving data outside of a simulation. Establish the capability to create, update, and use this data inside of the game server.

Week 8

Lecture: A closer look at the ways that data can be organized to store data for game world spaces.

Assignment: Create a world where items can be spawned, saved to a database, and subsequently reloaded. Enable these objects to be modified or destroyed in game, and the results saved to the game database.

Outcome: Exposure to the concepts of saving data outside of a simulation, and using that data to create worlds and players on an as-needed basis.

Week 9

Lecture: Why people play in virtual worlds, and how we can encourage them to do what we want them to do in a virtual world by playing with the world’s economy.

Assignment: Program a trading game based off the prisoner’s dilemma in Unity with several clients and a server. Save winnings to a database.

Outcome: Understand player motivations when it comes to virtual worlds, and apply that understanding to tweaking a simple game economy.

Week 10

Lecture: The design and implementation of asynchronous games which do not require
all the players to be concurrently connected to continue the gameplay.

**Assignment** Create a “Pictionary” style game using Unity and a remote database.

**Outcome** Establish competency in creating games that can be run in a turn-based manner across days or weeks.

**Week 11**

**Lecture** World building techniques, Open questions for virtual world developers. Testing methodologies used by virtual world designers. Theories on how virtual worlds might be used to create transferrable skillsets.

**Assignment** Take a target audience and craft the beginnings of a world space, story, and inhabitants that would compel these players to enter and remain in the world.

*Start of research proposal: Identify an interesting question raised by the motivations of players and the worlds that they choose to play in. Frame a research design to answer that question, along with five papers in a literature review to support your question.*

**Outcome** Understand the usage of story to set the stage for a virtual world’s experiences.

**Week 12**

**Lecture** Writing for virtual worlds, specifically classes and quests. Discussion of how this interaction is implemented via technology, and a presentation of one tool that can be used to create this interaction, Twine. Discussion of triggers and events that are used within questline checks.

**Assignment** Write a quest line inside of twine, and move it into Unity with a simple dialog system.

**Outcome** Gain competence in writing interactive stories that rely on data to customize reactions and outcomes to player choices.

**Week 13**

**Lecture** Balancing world systems

**Assignment** Write a quest line inside of twine, and move it into Unity with a simple dialog system.

**Outcome** Gain competence in writing interactive stories that rely on data to customize
reactions and outcomes to player choices.

**Week 14**

*Lecture* Deploying to devices

*Assignment* Get a multiplayer example running on a Google Android device.

*Outcome* Demonstrate the ability to build and run game applications on mobile devices and other nonstandard deployment targets.

**Week 15**

*Lecture* Special topics - projects

*Assignment* None, continue work on final project

*Outcome*

**Week 16**

*Lecture* Project Presentations

*Assignment* 

*Outcome*

**Grading Scale:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97 – 100</td>
<td>Outstanding achievement, given at the instructor’s discretion</td>
</tr>
<tr>
<td>A</td>
<td>93 – 100</td>
<td>Excellent achievement</td>
</tr>
<tr>
<td>A–</td>
<td>90 – 92.99</td>
<td>Very good performance and quality of work</td>
</tr>
<tr>
<td>B+</td>
<td>87 – 89.99</td>
<td>Good performance and quality of work</td>
</tr>
<tr>
<td>B</td>
<td>83 – 86.99</td>
<td>Modestly acceptable performance and quality of work</td>
</tr>
<tr>
<td>B–</td>
<td>80 – 82.99</td>
<td>Marginal acceptable performance and quality of work</td>
</tr>
<tr>
<td>F</td>
<td>0 – 82.99</td>
<td>Unacceptable work (Course must be repeated for credit)</td>
</tr>
</tbody>
</table>

No credits toward graduate 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 dishonesty.
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. **Grade freeze:** One week after a grade has been assigned it will not be changed.

3. **24 hours no-questions:** One day before a project is due, no questions will be answered on the material.

4. **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

5. **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.

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

7. **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 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.

8. **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.

9. **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.

10. **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.

11. **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.

12. **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

13. **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.

14. **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.