

Course Syllabus – CAP4122.01- Spring 26

Disclaimer - The instructor reserves the right to modify the syllabus as necessary throughout the semester, except for the grading scale, grade distribution, and learning outcomes, which will not change.

Course Information

- **Course Number and Title:** CAP4122 (Section 01) – Virtual Reality
- **Credit Hours:** 3 Lecture
- **Academic Term:** Spring 2026

Instructor Information

- **Instructor:** Dr. Abdelwahab Hamam
- **Office Location:** BARC 2233
- **Office Hours:** M/W/F 11-12 @BARC 2233 in person
- **Email address:** ahamam@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode:** Face-to-face, M/W/F 9:00-9:50 am, IST 1026
- **Course Website:** Canvas
- **Official Catalog Course Description:**
This course is to introduce students to the fundamentals of Virtual Reality (VR). The course topics include bird's eye view, VR geometry, lights and optics, psychology of human vision, visual perception, visual rendering, motion, tracking, interaction, audio, and evaluation and experience.
 - **Course Pre-Requisites:** COP 2080 - CS Problem Solving and Solution or COP 3337 - Object Oriented Programming
 - **Communication/Computation Skills Requirement (6A-10.030):** N
- **Required Texts and Materials:**
 - "Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR", Steve Aukstakalnis, Addison-Wesley Professional, 1 edition, 2017. **ISBN-13: 978-0134094236**
 - Unity + VR/AR SDKs
- **Reference:**
 - "Virtual Reality Technology ", 2nd Edition, G.C. Burdea and P. Coiffet, Wiley, 2003. **ISBN: 9780471360896**
 - (more web resources will be introduced as we move on)

Course Learning Outcomes (CLOs)

The objective of this course is to familiarize students with the components of virtual and augmented reality, distinguish between types of VR and AR, understand the user experience of virtual environments, and learn state-of-the-art VR technology and applications.

Upon successful completion of the course, students will be able to:

- CLO-1: **Apply** VR interaction techniques.
- CLO-2: **Develop** VR environments.
- CLO-3: **Develop** VR applications.

Alignment with Program Outcomes (ABET)

The Computer Science program at Florida Polytechnic University has aligned its Program Outcomes with the ABET Students Outcomes 1-6 from the ABET General Criterion 3 and the ABET Program Criteria. The table shown below summarizes how the CLOs stated above align with the Program Outcomes (ABET 1-6).

These outcomes are:

1. **Analyzing a Problem:** Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions
2. **Implementing a Solution:** Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline
3. **Communicating Effectively:** Communicate effectively in a variety of professional contexts
4. **Performing Legal & Ethical Analysis:** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles
5. **Collaborating as a Team:** Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline
6. **Applying theory:** Apply computer science theory and software development fundamentals to produce computing-based solutions.

Program Outcome (ABET)	CLO-1	CLO-2	CLO-3
Analyzing a Problem	X		
Implementing a Solution	X		
Communicating Effectively			X
Performing Legal & Ethical Analysis	X		
Collaborating as a Team			X
Applying theory		X	X

Course Policies

Attendance

Students in face-to-face courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" ([University Policy](#), FPU-5.0010AP).

Students are expected to attend class IN PERSON. Unexcused absence will affect the participation grade for the course. Exceptions to any attendance requirements may be made on a case-by-case basis.

Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a [code of conduct](#) referral.

Late Work/Make-up work

Late submissions could be accepted with PENALTY up to three days. The penalty will be 15% per day. No submission is allowed after 72 hours of the deadline. Exceptions to any late work policy may be made on a case-by-case basis.

Absence from an exam or quiz will result in a grade of **zero** for that test except if an **official proof** is provided to the instructor (such as a doctor's note) to write a make-up test. This will be decided on a case-by-case basis.

Grading Scale

A \geq 93.00	B+ 87.00 - 89.99	C+ 77.00 - 79.99	D+ 67.00 - 69.99	F \leq 59.99
A- 90.00 - 92.99	B 83.00 - 86.99	C 73.00 - 76.99	D 63.00 - 66.99	
	B- 80.00 - 82.99	C- 70.00 - 72.99	D- 60.00 - 62.99	

(See also [University Grading Policy](#)).

Assignment/Evaluation Methods

Assignments	24%
Participation	7%
Quizzes	10%
Final Project	22%
Exam	22%
Term assignment	15%
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Total	100%

Assignments: Tentatively three assignments will be provided and graded. (Assignments are subject to change depending on progress of the course)

- o Assignment 1: Designing a marker-base AR solution (CLO3)
- o Assignment 2: Designing a VR user interface (CLO1)
- o Assignment 3: Evaluating VR/AR applications. (CLO3)

Exam: The exam will be administered in class and will contain questions about the lectures including theory and general questions about virtual and augmented reality

Term Assignment: This is a group assignment about exploring and presenting a state-of-the-art topic to the class. There is no report required, just an in-class presentation. This year's theme of term assignments is state-of-the-art topics on the Metaverse.

Project: This is a group project to be done using an HMD headset (CLO 2)

Miscellaneous

- Email communication should be done through the official floridapoly.edu email. Put the course name or number in the subject line.
- You are responsible for your submission on Canvas, and your submission is accepted on time. This includes that you have submitted the correct file(s) and that the file(s) are not corrupt.
- If you are working in a group, you should have a backup plan if a member drops out. Please communicate group member disputes to me as soon as possible if you feel this is necessary.
- There is nothing that can be done to raise your grade at the end of the semester after all submission deadlines have passed.
- Although I try to announce everything on Canvas, you are responsible for in-class announcements.

Tentative Course Schedule

- Important Dates: <https://floridapoly.edu/academics/academic-calendar/index.php>

Week	Date	Topic (tentative)	Key Dates (tentative)
1	01/12	Intro / Syllabus	
	01/14	Intro to VR/AR (history, definitions, development)	
	01/16	Intro to Virtual Space	
2	01/19	No Class- Martin Luther King Jr. Holiday	Groups for Project Term Assignment – topic Project Description
	01/21	Vision (mechanics of sight)	
	01/23	Vision (depth cues)	
3	01/26	HMDs (Display fundamentals)	Assignment 1 Quiz 1
	01/28	HMDs (latest Displays)	
	01/30	Audition (Mechanics of hearing)	

4	02/02	Audio Interfaces (conventional and binaural)	Quiz 2	
	02/04	Sense of Touch (mechanics of feelings)		
	02/06	Research (library resources)		
5	02/09	Haptics (tactile devices)	Term Assignment – references Project Report (Pick Project Equipment, API..)	
	02/11	Haptics (force feedback devices)		
	02/13	Haptics (haptic motors characteristics)		
6	02/16	Olfaction/taste (latest displays)	Quiz3	
	02/18	Senses in VR (wrap)		
	02/20	AR tools		
7	02/23	Sensors (tracking motion)	Assignment 2	
	02/25	Sensors (tracking motion)		
	02/27	Navigation and interaction (2d vs. 3d)		
8	03/02	Navigation and interaction (Brain interface)	Exam	
	03/04	Review		
	03/06	Exam		
9	03/09	Applications (entertainment/arts)	Assignment 3 Term Assignment – Progress (power point template, references update...)	
	03/11	Applications (architecture and construction)		
	03/13	Applications (science and engineering)		
10	03/16	SPRING BREAK – No Classes		
	03/18			
	03/20			
11	03/23	Applications (health and medicine)	Project Progress Report	
	03/25	Applications (Aerospace and defense)		
	03/27	Applications (telerobotic and telepresence)		
12	03/30	Applications (education/ social /big data)	Quiz 4	
	04/01	Applications wrap		
	04/03	Metaverse (latest development on the metaverse)		
13	04/06	Term Assignment Presentation	Term Assignment – Presentation	
	04/08	Term Assignment Presentation		
	04/10	Term Assignment Presentation		
14	04/13	Term Assignment Presentation		
	04/15	Term Assignment Presentation		
	04/17	Term Assignment Presentation		
15	04/20	UX (experience in VR and AR)	Quiz 5	
	04/22	Human Factors (cyber sickness)		
	04/24	Legal consideration (VR and litigations issues)		
16	04/27	Future of VR (what the future hold)		

Holidays/Breaks:

1. Jan 19, 2026 - Martin Luther King Jr. Holiday
2. Feb 10, 2026- Career Day (it is a Tuesday, so we don't have a class either way)
3. March 16-20, 2026 – Spring Break

Midterm:

To Be confirmed (Tentatively 03/06)

Term Assignment Presentations:

In class, during the time period 4/06 – 4/17

(presentations due, attendance is mandatory, no laptops or electronics allowed during presentations)

Final Demos: (project due)

Set by the registrar during May 4 -8, 2026

Sample Rubric for Report and Presentations

The term assignment presentation and project demo will be evaluated using rubrics similar to the ones included below.

Tentative Term Assignment Presentation Rubric

CRITERIA	Exemplary (7)	Very Good (5)	Good (3)	Fair (1)	Needs Improvement (0)
Introduction /Topic investigated is clear	The purpose of why the study is conducted and the hypothesis to be tested are clearly stated.	The purpose of why the study is conducted is mentioned but the hypothesis to be tested is not clearly described.	The purpose of why the study is conducted is vaguely mentioned and the hypothesis to be tested is not clearly described.	The purpose of why the study is conducted is not mentioned and the hypothesis to be tested is not clearly described.	Both the purpose of why the study is conducted and the hypothesis to be tested are not stated.
Background and Challenges	Enough background provided and clearly presented. Challenges clearly stated	Enough background provided and presented. Challenges are mentioned	One of the two is mentioned. OR both are vaguely mentioned	Not clear what the background or challenges are .	No Background or Challenges presented
Methodology (within references)	The step by step process of how the study was conducted is thoroughly elucidated including the materials used, programs tested, and other important information.	Most of the steps in the procedure of how the study was conducted are clearly described with very few important information missing.	Some of the steps in the procedure of how the study was conducted are described with few important information missing.	Only very few steps in the procedure of how the study was conducted are described with a lot of important information missing.	The steps in the procedure of how the study was conducted and all other relevant information are missing.
Comparison	Advantages, disadvantages clearly compared	Advantages disadvantages between references mentioned	Advantages disadvantages between references vaguely mentioned	Advantages disadvantages between vaguely mentioned	No Comparison
Conclusion	The presentation is well concluded with a look towards the future	The presentation is somewhat concluded, no real future work mention	The presentation is concluded without a look at future work	The presentation is vaguely concluded without a look at future work	No clear conclusion
Citations	All the websites, literature, materials, personal interviews, and	Some but not all of the websites, literature, materials, and other things	A few but not all of the websites, literature, materials, and	Only very few of the websites, literature, materials, and	There is no Literature Cited section in the poster and no references are

	other things used in the study are properly cited following a specific publication format.	used in the study are properly cited following a specific publication format.	other things used in the study are properly cited following a specific publication format.	other things used in the study are properly cited following a specific publication format.	listed anywhere in the poster.
Relevance to Virtual Reality/ Augmented reality	Clearly outlines how research relates to VR/AR.	The relevance of the Research to VR/AR is mentioned and is well explained.	The relevance of the Research to VR/AR is mentioned but needed more explanation.	The relevance of the research to VR/AR is mentioned but no clear explanation.	The relevance of the research to VR/AR is not mentioned at all.
Overall Organization and Aesthetics	All of the components are well elucidated. Fonts used are clear and readable. Flow of information is logical and well organized. Color and illustrations used are aesthetically pleasing and very professional.	Most of the components are well elucidated. Fonts used are clear and readable. Flow of information is logical and quite organized. Color and illustrations used are quite pleasing and professional.	Some of the components are well elucidated. Fonts used are not very clear but readable. Flow of information is logical but needs better organization. Color and illustrations used are quite pleasing and professional.	Only few of the components are well elucidated. Fonts used are not clear and difficult to read. Flow of information is hard to follow and needs better organization. Color and illustrations used are quite pleasing but not professional.	None of the components are well elucidated. Fonts used are not clear and difficult to read. Flow of information is hard to follow and has no organization. Color and illustrations used are neither pleasing nor professional.
Individual Delivery (each individual separately)	The presenter is very well prepared, establishes eye contact with the audience, speaks clearly, and answers the questions with confidence.	The presenter is well prepared, establishes eye contact with the audience, but speaks very low, and answers the questions with confidence.	The presenter is prepared, does not establish eye contact with the audience, speaks very low, and answers the questions with confidence.	The presenter lacks preparation, does not establish eye contact with the audience, speaks very low, tries to answer questions but unsubstantial.	The presenter did not prepare at all, does not establish eye contact with the audience, speaks very low, cannot answer questions.

Tentative Project Rubric

CRITERIA	Excellent (5)	Good (4)	Average (3)	Weak (2)	Below Expectations (1)
Interactivity	controllers are responding properly, and it is clear what the user should do	N/A	controllers are not responding properly, or it is not clear what the user should do	N/A	controllers are not responding properly, and it is not clear what the user should do
Quality	The models, and events are of high quality	The models, or events need improvement	The models, AND events need improvement	The models, AND events are of low quality	The models, AND events are of poor quality
Fluidity	The transitions are smooth,	The transitions are not very smooth	The transitions are jittery	The transitions are very jittery	The transitions do not make sense , user feels lost
Report	Report is complete. All elements are included such as UX, movement, interactivity, elements learned in class.....	Report is not fully complete some elements are missing or they are not explained properly or thoroughly	Report is not complete elements are missing or they are not explained properly or thoroughly	Report is not fully complete many elements are missing or they are not explained properly or thoroughly	The report is extremely basic, with majority of elements missing
Screenshots	Enough Screenshots are included	N/A	Some Screenshots are included	N/A	No Screenshots are included
High Quality Video	Video of the simulation in high resolution properly included	N/A	Video not taken properly or not in high resolution but included	N/A	Video not included or video is not playing
Modification from Proposal	The project theme and interactions are not modified from the proposal without prior approval	N/A	The project theme and interactions are modified from the proposal without prior approval	N/A	The project theme and interactions are modified from the proposal without prior approval and the project shifts dramatically from the approved proposal

Academic Support Resources

- **Library:** Students can access the Florida Polytechnic University Library through the University website and [Canvas](#), on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center (TLC):** The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
- **Knack Tutoring:** Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches:** All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center:** Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit <https://floridapoly.edu/writingcenter>.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodation for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodation.

If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the [ODS student portal](#) and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodation must be made in advance. Accommodation is not retroactive.

If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
[ODS website: www.floridapoly.edu/disability](http://www.floridapoly.edu/disability)

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See [University Policy](#).)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator.

Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University [Ombuds Office](#), BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at [Peace River Center](#), 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The [Title IX Coordinator](#) is available for any questions to discussion [resources and options](#) available.

Academic Integrity

The faculty and administration take academic integrity very seriously. Violations of [academic integrity regulation](#) include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment, to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is prohibited.

Civility and Collegiality

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.