

**SYLLABUS**  
**Bowie State University**  
**School of Arts and Sciences**  
**Department of Computer Science**

**COSC 729: Virtual Reality and its Applications**  
Spring Semester 2022

INSTRUCTOR: Dr. Sharad Sharma  
CLASS HOURS: Wednesday: 4:55 PM – 7:25 PM (Virtual)  
OFFICE HOURS: Wednesday: 2:55 – 4:55 PM, or by appointment  
<https://us.bbcollab.com/guest/2b2d24ea293043d0baf1edffede7acac>  
Anonymous dial in:  
+1-571-392-7650  
PIN: 690 078 4424  
OFFICE LOCATION: Computer Science Building, Room 317  
E-MAIL: [ssharma@bowiestate.edu](mailto:ssharma@bowiestate.edu)  
COURSE WEBSITE: <https://sharadonly.github.io/vrml/index.htm>

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**Required Text:** Burdea, Grigore C., and Coiffet, Philippe. *Virtual Reality Technology*, 2nd ed. Wiley-Interscience, 2003.

**Prerequisite:** COSC 504

**Reference Book(s):**

1. Bowman, D, Kruijff, E., LaViola Jr., J. and Poupyrev, L., *3D User Interfaces: Theory and Practice*, Addison-Wesley, Boston, 2005, ISBN 0-201-75867-9
2. Sherman, William R., and Craig, Alan B., *Understanding Virtual Reality: Interface, Application, and Design*, Morgan Kaufmann Publishers, 2003
3. Roy S. Kalawsky: *The Science of Virtual Reality and Virtual Environments*, Addison-Wesley, 1994, ISBN 0-201-63171-7
4. Kelly L. Murdock, *3ds Max 8 Bible*, Addison-Wesley, 2008, ISBN: 978-0-471-78618-4
5. Jed Hartman, Josie Wernecke, Rick Carey: *The VRML 2.0 Handbook - Building Moving Worlds on the Web*, Addison-Wesley, 1996, ISBN 0-201-47944-3

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**COURSE DESCRIPTION**

The goal of this course is to introduce students to Virtual Reality (VR) hardware, software, and provide an opportunity for them to apply this knowledge to applications for education and games. This course applies cutting-edge VR technology currently available in academia and industry. Students will design, model, and script the VR environment by developing a complete VR application as a group project.

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**TEACHING MODES** - Traditional classroom instruction involving in-class lectures/demonstrations and laboratory assignments. Pertinent course documents, assignments, grades and special announcements will be posted on the course website. This will be supplemented by lecture demonstrations for modeling and scripting VR environment.

**Program Outcomes (PO):**

This course is required for all computer science major students and has significant relationship with the following program outcomes:

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (d) An ability to function effectively on teams to accomplish a common goal
- (f) An ability to communicate effectively with a range of audiences
- (g) An ability to analyze the local and global impact of computing on individuals, organizations, and society
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity.

### **STUDENT EXPECTED OUTCOMES**

The essential objectives for this course are to:

1. Demonstrate knowledge of basic principles of VR.
2. Design and Develop a complete Virtual Reality environment by working in a team.
3. Acquire skills to create and understand the process of creating a virtual environment.

### **STUDENT COURSE LEARNING OBJECTIVES (SCLO)**

Upon completion of this course, the student will be able to:

1. Understand the basic principles of VR. (Instrument: Assignments, Exams, PO: b,c)
2. Describe the historical development of VR. (Instrument: Assignments, Exams, PO: b,c)
3. Understand potentials and limits of VR (Instrument: Assignments, Exams, PO: i)
4. Understand the process of creating virtual environments. (Instrument: Assignments, Exams, PO: b,c)
5. Identify and describe applications for current virtual reality hardware and software. (Instrument: Project, Exams, PO: i)
6. Design and develop a complete VR application through group projects. (Instrument: Project, PO: d,f,i,j,k)

**GRADING CRITERIA:** The overall grades will be determined based on a combination of tests, projects, and attendance/attentiveness as described below:

		GRADES	
Assignments (5)	35%	90-100%	A
Mid-term Exam	15%	80-89%	B
Group Project (1)	35%	70-79%	C
Final Exam	15%	60-69%	D
		Less than 60%	F

**Group Projects:** A major part of this course is the group project. Lectures will prepare the class for the development of VR applications in any area. Groups of 2 to 3 students will select a topic of their own choice and submit a project proposal for evaluation and approval by the teaching instructor. The groups will then develop a complete VR application, and demonstrate the application to the class. The project topics are determined by the creativity and imagination of the students. Project deliverables and related due dates are explained in detail on the course website. Each project will be graded as follows:

- Presentation to class --- 20%
- Demonstration to teaching instructor & staff --- 60%
- Project report --- 20%

The project grade for each group member may be modified by taking into account a member's contribution to the project. Projects, Mid-term and Final exams are mandatory. Mid-term will not include the grades of projects.

- \* There will be no make-ups for Mid-Term Exam and Final Exam.
- \* Late submissions for assignments/homework: 10 marks will be deducted every day until submission.
- \* Any changes to the above will be posted on the course website.
- \* Exams are given in the class room during class time.
- \* Exams are closed notes, closed book, open mind.

<b>26-Jan</b>	Introduction	
<b>2-Feb</b>	VR Input Devices and 3Ds Max	<a href="#">Assignment 1</a> : 3Ds Max + Google Sketch Up Due: 9 Feb
<b>9-Feb</b>	Python Programming (Vizard)	<a href="#">Assignment 2</a> : Vizard Due: 23 Feb
<b>16-Feb</b>	VR Input Devices, Vizard/ Python Programming	<a href="#">3D First Person Shooter game</a> , <a href="#">Google Sketchup</a>
<b>23-Feb</b>	Unity Programming: <a href="#">Unity</a> , <a href="#">Unity Interface</a> , <a href="#">Unity UI Interface</a> , <a href="#">Interface Overview</a> , <a href="#">survival-shooter-tutorial</a>	<a href="#">Assignment 3</a> : Vizard 2 Due: 2 March
<b>2-Mar</b>	VR Input Devices, Vizard	
<b>9-Mar</b>	VR Output Devices	<a href="#">Assignment 4</a> : Unity3D, Due: 23 March
<b>16-Mar</b>	<b>Mid Term Exam</b>	Unity 3D UI <a href="#">Player Settings</a> , <a href="#">Slider</a> , <a href="#">Button</a> , <a href="#">Health and Damage</a>
<b>23-Mar</b>	<b>Spring Break</b>	Assignment 5: Unity3D, Due: 6 April
<b>30-Mar</b>	Computer Graphics Principles for VR, Geometric Modeling Principles for VR	Project Proposal Presentation & Report
<b>6-Apr</b>	Human Factors in VR	
<b>13-Apr</b>	Data Visualization	
<b>20-Apr</b>	Traditional Applications in VR	Mid Project Demo
<b>27-Apr</b>	Emerging Applications in VR/Augmented Reality	
<b>4-May</b>	<b>Group Project Presentations/ Demo</b> , Presentations.	<b>Due date for Report</b>
<b>11-May</b>	<b>Reading Day</b>	
<b>18-May</b>	<b>Final Exam</b>	

#### SPECIFIC STUDENT REQUIREMENTS:

1. Students are expected to maintain regular attendance at class/Labs and examination periods. If a student misses a test (with an excused absence), it is the responsibility of the student to make arrangements with the instructor for make-up. Generally make-ups are permitted only in emergency and special situations and within a week of the test.
2. Students will be expected to finish their homework/assignments before coming to the class.
3. Students may need to spend a fair amount of time outside class to work on the projects.
4. Each student can choose their own hardware/software to work on the computer projects. However, if they choose to use an off campus facility, they should be able to demonstrate the run session on campus.
5. Students are responsible for making up all assignments missed because of excused absences.
6. All homework and assignments are to be turned in *on or before the due date*, even if class is cancelled for *any* reason or you are not able to attend class. Assignments may be submitted in class, slipped under my office door, or given to me during my office hours. It is each individual student's responsibility to submit homework and assignments on time.

#### ATTENDANCE:

Students are expected to maintain regular attendance. After three unexcused absences, students will be referred to the chairperson. Students are responsible for updating themselves with any changes to the contents of the syllabus that the instructor brings to the attention of the class.

**ADA Statement:** Students with disabilities who wish to receive ADA accommodations should report to the Office of Special Populations, Martin Luther King Building, Room 136 (301-860-3292).

**Cheating, copying:** Any assignment that looks like it was copied, in whole or in part, from another student, an assignment from another term, a program on the web, etc. will receive a 0.

**Policy on Cell Phones, etc.**

The ringers of cell phones, pagers and any other electronic devices must be turned OFF or set to vibrate during class time. Only calls of an urgent or emergency nature should be taken and you should step outside the classroom to do so. If you do not observe this policy, you may be asked to leave the class for that day and an unexcused absence will be incurred.

**ENGLISH PROFICIENCY**

Please take your English Proficiency Examination as early as possible!

After completing ENGL 101 and ENGL 102, students must take and successfully pass the Bowie State University English Proficiency Examination. Transfer students who completed their English composition requirements at another university should take the English Proficiency Examination during their first semester of enrollment at the University.

**CLASS CANCELLATIONS**

Classes will be cancelled when University is closed due to inclement weather, which will be announced over public radios/TV or through campus information (301-860-4000) or public safety (301-860-4040).

**IMPORTANT TELEPHONE NUMBERS:**

**Dept of Comp Sc (Secretary):** (301) 860-3960

**Dept of Comp Sc (Fax):** (301) 860-3979

**Bowie State University (Main):** (301) 860 4000

**In case of inclement weather (snow etc.) please call (301) 860 4040 to find out if the university is open.**