Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

Module: CAD Rendering

INDCR401

Perform CAD Rendering

Competence

RQF Level: 4

Learning Hours 80

Credits: 8

Sector: Construction and Building Services

Trade: Interior Design

Module Type: Specific module

Curriculum: CBSIND401-TVET Certificate IV in Interior Design

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<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes skills, knowledge and attitudes required to create realistic and visually appealing representations of digital models or designs that involves the process of generating high-quality images or animations that simulate the appearance of an object or space with realistic lighting, textures, materials, and shading. The goal of rendering CAD is to communicate design intent, evaluate aesthetics, and provide clients, stakeholders, or manufacturers with a visual understanding of the final product or design concept.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">CAD software</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group work and presentation</td><td>30%</td></tr>
<tr><td>• Individual work</td><td>40%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Determine rendering software	1.1. Rendering software is properly selected according to the software performance and features.
	1.2. Rendering software is properly installed and launched in line with computer and software specifications
	1.3. Navigation tools are correctly explored according to the CAD applications.
2. Import drawings into rendering software	2.1. Drawing file formats' compatibility are appropriately verified in accordance with rendering software requirements
	2.2. Drawing files are correctly imported as per rendering software requirements
	2.3. The imported drawing details are properly verified as per expected drawing specifications.
3. Apply rendering techniques	3.1. 2D drawing commands are properly used in accordance with CAD drawing standards.
	3.2. 3D drawing tools and commands are properly used in accordance with CAD drawing standards.

	3.3. Nature lights are effectively set in line with rendering environment.
	3.4. Relevant artificial light Textures and colours are appropriately applied according to the client needs and design standard specifications.
	3.5. Camera angle is accurately set in accordance with the view and focused area.
	3.6. Resolution is accurately set in accordance to the quality desired image.
	3.7. Other parameters are accurately set as per design specifications and client's needs.
4. Refining rendering	4.1. The design quality is correctly checked in the accordance with the design brief and design standards.
	4.2. Design is correctly modified using relevant application software as per design brief and standards.
	4.3. The final rendered file is properly exported in accordance with expected design specifications.

Intended Knowledge, Skills and Attitude

Knowledge	Skills	Attitude
✓ Identify rendering software ✓ Identify rendering tools and CAD features ✓ Explain the design brief and standards ✓ Identify rendering materials	✓ Use navigation tools ✓ Apply drawing commands ✓ Configure software settings ✓ Set software camera angles ✓ Export final rendering design works	✓ Pay attention to design project details ✓ Respect client needs and design requirements ✓ Use creativity and innovation throughout the design works

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Determine rendering software 2. Import drawings into rendering software 3. Apply rendering techniques 4. Refining rendering
Learning outcome 1: Determine rendering software	**Learning hours: 15**

Indicative content

- **Types of rendering software**
  - ✓ V-Ray
  - ✓ Sketchup
  - ✓ Cinema 4D
  - ✓ 3D Max
  - ✓ Lumion
  - ✓ Autodesk Revit
  - ✓ Octane Render
  - ✓ Rhinoceros 3D
  - ✓ Maya
  - ✓ Enscape
  - ✓ Artlantis
  - ✓ Maxwell Render
  - ✓ Arnold
  - ✓ Blender
  - ✓ Twin motion
- **Installation of rendering software**
- **Software rendering features:**
  - ✓ Ray tracing
  - ✓ Anti- aliasing
  - ✓ Texture mapping
  - ✓ Real time rendering
  - ✓ Depth of field
  - ✓ Lighting simulation
  - ✓ Material mapping
- **Computer rendering specifications**

- ✓ Graphics Card
- ✓ Operating system
- ✓ CPU (processor)
- ✓ Screen resolution
- ✓ System memory (RAM)
- ✓ Hard drive Capacity
- ✓ Power Supply

- **Software specifications**
  - ✓ System requirement
  - ✓ File format
  - ✓ Software version
- **Rendering navigation tools:**
  - ✓ Material editor
  - ✓ Lighting tool
  - ✓ Camera control
  - ✓ rendering setting
  - ✓ Post-Processing effect

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ Internet
Tools	▪ Software
Facilitation techniques	▪ Using brainstorming technique, teacher asks students to discuss about different rendering software, required computer specifications and choose the rendering software to be used. ▪ Each student installs rendering software and the teacher asks them to explore the rendering features and navigation tools. ▪ The teacher wraps up with question-and-answer session.
Formative assessment methods /(CAT)	▪ Written based assessment ▪ Oral Presentation

Learning outcome 2: Import drawings into rendering software	**Learning hours: 20**

Indicative content
• **3D file formats** ✓ .skp ✓ .3ds ✓ .obj ✓ .dae ✓ .fbx ✓ .dwj ✓ .lwo ✓ .c4d ✓ .max ✓ .blend ✓ .lx4 • **Import drawing files** • **Verify drawing details**

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ Internet
Tools	▪ Rendering software ▪ Flash disk ▪ Hard drives
Facilitation techniques	▪ Teacher asks each student to import drawing files into the rendering software. ▪ Teacher randomly selects few students to discuss about 3D file format and share their experiences during the activity.
Formative assessment methods /(CAT)	▪ Written based assessment ▪ Oral Presentation ▪ Performance

Learning outcome 3: Apply rendering techniques	Learning hours: 25

Indicative content

- **2D drawing commands**

✓ Move
✓ copy/Paste
✓ Rotate
✓ offset
✓ Drag
✓ Filet/Chamfer
✓ Scale
✓ mirror
✓ Trim
✓ Extend
✓ Stretch
✓ Erase
✓ Hatch

- **3D drawing commands**
  - ✓ Move
  - ✓ copy/Paste
  - ✓ Rotate
  - ✓ pull/Push
  - ✓ offset
  - ✓ Drag
  - ✓ Filet/Chamfer
  - ✓ Scale
  - ✓ mirror
  - ✓ Trim
  - ✓ Extend
  - ✓ Stretch
  - ✓ Erase
  - ✓ Orbit/ Zoom/ Pan
- **Rendering Techniques:**
  - ✓ Z-Buffer
  - ✓ Shading and lighting
  - ✓ Texture/Bump mapping
  - ✓ Ray tracing and ray casting
  - ✓ Radiosity
- **Natural lights setting**
  - ✓ Artificial lights
  - ✓ Textures
  - ✓ Colors application

- **Camera angle setting**
- **Resolution setting**
- **Other rendering parameters settings**
  - ✓ Materials
  - ✓ Depth of field
  - ✓ Anti-aliasing

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ internet
Tools	▪ software
Facilitation techniques	• Teacher asks each student to render the imported drawings by applying materials, textures, performing necessary settings such as environments, lights, camera angles, resolutions.
Formative assessment methods /(CAT)	▪ Written based assessment ▪ Oral Presentation ▪ Performance

Learning outcome 4: Refining rendering	**Learning hours: 20**
Indicative content	

- **Factors to consider while checking the quality of rendered design**
  - ✓ Resolution of rendered design
  - ✓ Camera setting
  - ✓ Artificial light and natural light
  - ✓ Texture and colours

- **Modification of rendered design**
- **Exporting final rendered files**

Resources required for the learning outcome	
Equipment	▪ Computer
Materials	▪ N/A
Tools	▪ Software
Facilitation techniques	▪ Refer to the activity from learning outcome 3, teacher asks each student to refine their rendered files by checking resolution of rendered design, camera setting, artificial light and natural light, texture and colours ▪ Students export their final rendered files ▪ Teacher assesses all students' works and provides them with feedbacks.
Formative assessment methods /(CAT)	▪ Performance assessment ▪ Products assessment

Integrated/Summative assessment

Integrated situation

MSD Ltd company won a tender of designing a modern kitchen for Kigali Smart Hotel located at Nyarugenge city. This company would like to hire an interior designer technician to make rendered drawings of the kitchen of that hotel. The company also will provide all drawings, materials, tools and equipment that are needed to complete this design task. As an interior designer technician, you are requested to produce well rendered images referring to the given CAD drawing of the kitchen. This task should be accomplished in 6 hours.

Note:
-This kitchen layout is an L-Shaped style having 600cmx300cm, 350cm of height.
-The kitchen rendered images must show all different views , perspective and elevations.

- The kitchen rendered images must also show the construction materials, texture, colour, lights, and other rendering parameters used.

Resources

Tools	▪ Software
Equipment	▪ Computer hardware ▪ Printer
Materials/ Consumables	Internet

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Determine rendering software	1.1. Rendering software is properly selected according to the software performance and features.	Rendering software is properly selected			16
		V-Ray			
		Sketchup			
		Cinema 4D			
		Lumion			
		Autodesk Revit			
		Rhinoceros 3D			
		Enscape			
		Artlantis			
	1.2. Rendering software is properly installed and launched in line with computer and software specifications	Rendering software is properly installed			8
	1.3. Navigation tools are correctly explored according to the CAD applications.	Navigation tools are correctly explored			12
		Material editor			
		Lighting tool			
		Camera control			

		Rendering setting			
		Post-Processing effect			
2. Import drawings into rendering software.	2.1. The imported drawing details are properly verified as per expected drawing specifications.	The imported drawing details are properly verified			10
		Materials			
		Texture			
		Furniture			
		Accessories			
		Lights			
3. Apply rendering techniques	3.1.3D drawing tools and commands are properly used in accordance with CAD drawing standards.	3D drawing tools and commands are properly used			24
	3.2. Nature lights are effectively set in line with rendering environment.	Nature lights are well set			
	3.3. Relevant artificial light Textures and colours are appropriately applied according to the client needs and design standard specifications.	Artificial light Textures and colours are applied			
		Artificial lights			
		Textures			
		Colors application			
	3.4. Camera angle is accurately set in accordance with the view and focused area.	Camera angle is well set			12

	3.5. Resolution is accurately set in accordance to the quality desired image	Resolution is well set			
	3.6. Other parameters are accurately set as per design specifications and client's needs.	Other parameters are set			
		Materials			
		Depth of field			
		Anti-aliasing			
4. Refining rendering	4.1. The design quality is correctly checked in the accordance with the design brief and design standards.	The design quality is checked			8
		Resolution of rendered design			
		Camera setting			
		Artificial light and natural light			
		Texture and colours			
	4.2. Design is correctly modified using relevant application software as per design brief and standards.	Design is modified			5
	4.3. The final rendered file is properly exported in accordance with expected design specifications.	The final rendered file is exported			5
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

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