Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

CAD Software

NDCS401

Produce Drawings Using CAD Software

Competence

RQF Level: 4

Learning Hours 90

Credits: 9

Sector: Construction and Building Services

Trade: Interior Design

Module Type: Specific module

Curriculum: CBSIND401-TVET Certificate IV In Interior Design

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Issue Date: June 2023

<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the skills, knowledge and attitudes required to produce drawings using cad software. It is intended for learners who have successfully completed level III in interior design and pursuing level IV in interior design.
At the end of this module, learners will be able to Interpret preliminary sketches and drafts, create 2D drawings, make 3D model, create realistic renders, Create presentation layout.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Interior space assessment</td></tr>
<tr><td rowspan="6">Delivery modality</td><td>Training delivery</td><td colspan="2">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">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Interpret preliminary sketches and drafts	1.1. Annotations and labels are properly interpreted as per labeling standards.
	1.2. Spaces on drawings are properly interpreted according to spatial interpretation principles.
	1.3. Dimensions are properly extracted according to dimensioning principles.
2. Create 2D drawings	2.1. Software is appropriately chosen and installed according to drafting software types.
	2.2. 2D drawing tools and commands are properly used in accordance with CAD

	software types.
	2.3. Sketches and drafts are properly imported as per CAD software types.
	2.4. Outlines are properly traced according to line settings.
	2.5. Drawing symbols and components are properly applied according to the design specifications.
	2.6. Dimensions are properly marked according to dimensioning standards.
	2.7. Floor plans, sections and elevations are properly created according to design specifications.
3. Make 3D model	3.1. 3D drawing tools and commands are properly used in accordance with CAD software types.
	3.2. Interior volumes are properly created according to geometric composition.
	3.3. Materials are properly applied according to material palette.
	3.4. Interior features and details are properly created and added according to design specifications and design brief.
	3.5. Entourage is properly added according to design specifications and design brief.
4. Create realistic renders	4.1. Special effects are applied in line with weather, mode and visualization principles.
	4.2. Artificial lighting is properly applied according to lighting parameters and design brief.
	4.3. Scenes are properly created according to design details and specifications.
5. Create presentation layout	5.1. Design layout is properly created according to design specifications.
	5.2. Drawings are accurately exported according to drawings specifications.

	5.3. Drawings are correctly printed as per design layout format and drawing specifications.

Intended Knowledge, Skills and Attitude

Knowledge	Skills	Attitude
✓ Identify annotations and labelling ✓ Describe the geometrical shapes ✓ Identify CAD installation requirements ✓ Identify CAD tools ✓ Identify layout	✓ Install software ✓ Perform CAD basic settings ✓ Create geometrical shapes ✓ Apply dimensions ✓ Create realistic renders ✓ Perform Printing ✓ Create design layout ✓ Prepare design project presentation	✓ Use creativity and innovation throughout the design works ✓ Pay attention to design projects details ✓ Demonstrate punctuality during the implementation of design project ✓ Demonstrate resourcefulness in the new design trends

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Interpret preliminary sketches and drafts 2. Create 2D drawings 3. Make 3D model 4. Create realistic renders 5. Create presentation layout
Learning outcome 1: **Interpret preliminary sketches and drafts**	Learning hours: 12
Indicative content	

- **Labels and annotations**
    - ✓ Dimensions
    - ✓ Drawing numbers
    - ✓ Text notation
    - ✓ Symbols
    - ✓ Section details
    - ✓ Title block
    - ✓ Bills of material
    - ✓ Marker labels
    - ✓ Key and legends
    - ✓ Lines
    - ✓ Detail marker
    - ✓ Elevation marker
    - ✓ Section marker
- **Spatial principles**
    - ✓ Space allocation
    - ✓ Functional relationship
    - ✓ Circulation in traffic flow
    - ✓ Zoning and privacy
    - ✓ Focal point and view
    - ✓ Flexibility and adaptability
- **Dimensioning elements**
    - ✓ Measurement Units
    - ✓ Dimension Lines
    - ✓ Dimension Values
    - ✓ Extension Lines
    - ✓ lead lines
    - ✓ arrows
- **Dimension principles**
    - ✓ Dimension Placement
    - ✓ Dimension Tolerances
    - ✓ Dimension Styles
    - ✓ Clear Reference Points
    - ✓ Dimensioning Conventions

Resources required for the learning outcome	
Equipment	▪ computer hardware
Materials	▪ Papers ▪ Pencils ▪ Rubber

Tools	▪ Drawing set
Facilitation techniques	▪ Teacher writes a design brief that include location, use of space, material, measurements and timeline. ▪ Students individually are asked to draft sketches in line with the provided design brief. ▪ Teacher selects few students to present their sketches including annotations, labels and dimensions and teacher provides feedbacks by showing them sample standard sketches with all details.
Formative assessment methods /(CAT)	▪ Oral presentation

Learning outcome 2: **Create 2D drawings**	Learning hours: 24
Indicative content	

- **CAD software**
  - ✓ ArchiCAD
  - ✓ AutoCAD
  - ✓ Sketch up
  - ✓ Revit
  - ✓ Chief Architect
- **Install CAD software**
- **2D drawing tools**
  - ✓ line
  - ✓ shape
  - ✓ dimension
  - ✓ Selection
  - ✓ Erase
- **2D drawing Commands**
  - ✓ Move
  - ✓ Copy
  - ✓ Extend
  - ✓ stretch
  - ✓ Trim
  - ✓ File/chamfer
  - ✓ offset

- **Import sketches**
- **line settings**
  - ✓ Line type
  - ✓ Line weight
  - ✓ Line color
- **Drawing symbols and components**
  - ✓ Door and window
  - ✓ Electrical
  - ✓ Plumbing
  - ✓ Sanitary appliances
  - ✓ Structural
  - ✓ furniture
  - ✓ landscape
- **Create floor plans, sections and elevations**

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ Papers
Tools	▪ CAD software ▪ Pen ▪ Sketch book
Facilitation techniques	▪ Teacher provides CAD software and guides students to install it. ▪ Referring to the scenario from learning outcome 1, teacher asks students to create floor plans, sections and elevations of their previous sketches. ▪ Teacher observes and selects at least two students with different performance level to present (one with high performance and another with low performance) and the teacher provides feedbacks to close the session.
Formative assessment methods /(CAT)	▪ Performance assessment ▪ Oral presentation

Learning outcome 3: **Make 3D model**	Learning hours: 20
Indicative content	

- **3D Model software**
  - ✓ Arch cad.
  - ✓ Auto cad
  - ✓ Sketch up
  - ✓ Levitt
  - ✓ Chief Architect
- **3D CAD tools**
  - ✓ Modelling tools
  - ✓ Object and symbol insertion tools
  - ✓ Modifying tools
  - ✓ Selection tools
  - ✓ Property tools
  - ✓ Rendering tools
  - ✓ Animation tools
- **Geometric composition of interior volumes**
  - ✓ Walls
    - Chamfer and fillet
    - Straight and curved
    - Vertical and inclined
  - ✓ Floors
    - Levelled and inclined
    - Raised and lowered
  - ✓ Ceiling
    - Drop and inserted
    - Patterned
- **Material palette**
  - ✓ Wall materials
    - Bricks
    - Paints
    - Stones, etc
  - ✓ Floor materials
    - Tiles
    - Paint
    - Carpets, etc
  - ✓ Ceiling materials
    - wood
    - Paint
    - PVC, etc
- **Interior features and details**
  - ✓ Furniture
  - ✓ Light
  - ✓ Doors and window

- ✓ Accessories and decors
- ✓ Claddings
- ✓ Architectural details
  - Moldings
  - Arches, etc

- **Entourage**
  - ✓ Indoor garden elements
  - ✓ Animals
  - ✓ People, etc

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ Papers
Tools	▪ CAD software ▪ Pen ▪ Sketch book
Facilitation techniques	▪ Referring to the scenario from learning outcome 1, teacher asks the students to create a 3D model including all interior features and details. ▪ Teacher observes and selects at least two students with different performance level to present (one with high performance and another with low performance) and the teacher provides feedbacks to close the session.
Formative assessment methods /(CAT)	▪ Oral presentation ▪ Performance assessment ▪ Product assessment

Learning outcome 4: **Create realistic renders**	Learning hours: 20

Indicative content

- **Special effects**
  - ✓ Lighting and shadows
  - ✓ Textures and materials
  - ✓ Reflections and refractions
  - ✓ Particle effects
  - ✓ Motion blur

- ✓ Depth of field
- ✓ Post processing

- **Artificial lighting**
  - ✓ Compact fluorescent
  - ✓ Incandescent
  - ✓ Halogen
  - ✓ Fluorescent
- **Lighting parameters**
  - ✓ Intensity
  - ✓ Color temperature
  - ✓ Color rendering index
  - ✓ Distribution
  - ✓ Contrast
  - ✓ Uniformity
  - ✓ Glare
  - ✓ Energy efficiency
  - ✓ Maintenance
- **Create scenes**

Resources required for the learning outcome	
Equipment	▪ Computer hardware
Materials	▪ Papers
Tools	▪ CAD software ▪ Pen ▪ Sketch book
Facilitation techniques	▪ Referring to the scenario from learning outcome 1, teacher asks the students to create realistic renders of the created 3D model including special effects and artificial lighting. ▪ Students create scenes of rendered 3D model ▪ Teacher observes and selects at least two students with different performance level to present (one with high performance and another with low performance) and the teacher provides feedbacks to close the session.
Formative assessment methods /(CAT)	▪ Oral presentation ▪ Performance assessment ▪ Product assessment

Learning outcome 5: Create presentation layout	Learning hours: 14

Indicative content
• Design layout • Export drawings • Print drawings

Resources required for the learning outcome	
Equipment	▪ computer hardware ▪ projector ▪ printer ▪ standing board
Materials	▪ Papers ▪ Masking tape ▪ fabrics ▪ adhesives
Tools	▪ Pins ▪ Tape measure ▪ Leaser pointer ▪ CAD software
Facilitation techniques	▪ Referring to the scenario from learning outcome 1, teacher asks the students to create design layout, export rendered drawings and print them out. ▪ Teacher prepares final exhibition and invite external examiners to provide their inputs.
Formative assessment methods /(CAT)	▪ Oral presentation ▪ Performance assessment ▪ Product assessment

Integrated/Summative assessment

Integrated situation
HUYE district wants to construct a residential building for a vulnerable citizen. The building will be constructed in Ngoma sector/Tumba village. A company called YSCO LTD was hired to perform this project. As a CAD Technician from the above-mentioned company, you are requested to produce drawings of that building using CAD software. The building is a modern residential building having 3 bed rooms, a living room, a dining room, a kitchen, a store, 2 bath rooms and front and back verandah

The overall measurements of the building are 14*12 m (length and width) respectively

Drawing scale is 1:100
Work duration is 8 hours

Resources

Tools	▪ computer hardware ▪ printer
Equipment	▪ Papers
Materials/ Consumables	▪ CAD software ▪ Pen ▪ Sketch book

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
2. Create 2D drawings **(30%)**	Software is appropriately chosen and installed according to drafting software types.	Software is appropriately chosen			1
		Software is correctly installed			1
	2D drawing tools and commands are properly used in accordance with CAD software types.	Lines are properly drawn			2
		Shapes are properly created			2
		Dimensions are properly applied			2
		Selection tool is used			1
		Erasing tool is used			1
	Sketches and drafts are properly imported as per CAD software types.	Sketches are properly imported			1
		Drafts are properly imported			1
	Outlines are properly traced according to line settings.	Outlines are clearly visible			1
		Outlines are properly traced			1
	Drawing symbols and	Door symbols are properly			1

	components are properly applied according to the design specifications.	applied			
		window symbols are properly applied			1
		Electrical symbols are properly applied			1
		Plumbing symbols are properly applied			1
		Sanitary appliances symbols are properly applied			1
		Structural symbols are properly applied			1
		furniture symbols are properly applied			1
		landscape symbols are properly applied			1
	Dimensions are properly marked according to dimensioning standards.	Dimensions are appropriately applied			
	Floor plans, sections and elevations are properly created according to design specifications.	Floor plan is properly created			3
		Section is properly created			3
		Elevation is properly created			2
3. Make 3D model **(30%)**	3D drawing tools and commands are properly used in accordance with CAD software types.	Modelling tools are properly used			1
		Object and symbol are properly used			1
		insertion tools are properly used			1
		Modifying tools are properly used			1
		Selection tools are properly used			1
		Property tools are properly used			1
		Rendering tools are			1

		properly used			
		Animation tools are properly used			1
	Interior volumes are properly created according to geometric composition.	Geometrical compositions on walls are well created: - Chamfer and fillet - Straight and curved - Vertical and inclined			2
		Geometrical compositions on floors are well created: - Levelled and inclined - Raised and lowered			2
		Geometrical compositions on ceilings are well created: - Drop and inserted - Patterned			2
	Materials are properly applied according to material palette.	Wall materials are properly applied: - Bricks - Paints - Stones			2
		Floor materials are properly applied: - Tiles - Paint - Carpets			2
		Ceiling materials are properly applied: - wood - Paint - PVC			2
	Interior features and details are properly created and added according to design specifications and design brief.	Furniture is appropriately created			1
		Lights are appropriately created			1
		Doors and window are appropriately created			1
		Accessories and decors are appropriately created			1

		Claddings are appropriately created			1
		Moldings are appropriately created			1
		Arches are appropriately created			1
	Entourage is properly added according to design specifications and design brief.	Indoor garden elements are properly added			1
		Animals are properly added			1
		People are properly added			1
4. Create realistic renders **(30%)**	Special effects are applied in line with weather, mode and visualization principles.	Lights and shadows are properly applied			3
		Textures and materials are properly applied			3
		Reflections and refractions are well applied			3
		Particle effects are well applied			3
		Motion blur are properly applied			3
		Depth of field is well Positioned			3
	Artificial lighting is properly applied according to lighting parameters and design brief.	Compact fluorescent lights are properly applied			3
		Incandescent lights are properly applied			2
		Fluorescent lights are properly applied			2
		Halogen lights are properly applied			2

	Scenes are properly created according to design details and specifications.	Scenes are properly created			3
5. Create presentation layout **(10%)**	Design layout is properly created according to design specifications.	The layout is properly created			4
	Drawings are accurately exported according to drawings specifications.	Drawings are well exported			4
	Drawings are correctly printed as per design layout format and drawing specifications.	Drawings are properly printed			2
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

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