Autodesk Docs and Autodesk Takeoff in the Classroom

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- Industry Background: Structural Engineer, General Contractor, VDC Specialist
- Teaching: BIM for Construction Managers, BIM for Designers
- Research: Global Collaboration, Gamification, Virtual Environments
Presentation Agenda

- Course Structure
- Experience with Autodesk Construction Cloud in the Classroom
- Lessons Learned
Course Information

CNST 116 Computer Applications for Construction

- Students are 1st year CM majors
  - 20-30 students per section
- Meet 3x per week for 50 minutes

- Course Outline
  - AutoCAD – 1 week
  - Excel – 4 weeks
  - Revit / Autodesk Construction Cloud – 5 weeks
  - Bluebeam Revu – 3 weeks
  - Procore – 1 week
Course Delivery

CNST 116 Computer Applications for Construction

- Written step-by-step instructions
  - Allows student to work at their own pace
  - Instructions are provided digitally and printed (for single monitor work)
  - Limit to 1-2 pages per session

- Work is (mostly) completed in class

- Work is “checked off” at the end of class by the instructor or student assistant
BIM Across the Curriculum
Implemented Fall 2021

- CNST 116 Computer Applications for Construction (Required)
  - In specifically identified courses:
    - Reinforce software taught in CNST 116
    - Introduce new software, e.g. 3D coordination, 4D modeling

- CNST 462 Advanced Information Technology in Construction (Elective)
Experience with Autodesk Construction Cloud in the Classroom
<table>
<thead>
<tr>
<th>Week</th>
<th>Sun</th>
<th>Monday</th>
<th>Tues</th>
<th>Wednesday</th>
<th>Thurs</th>
<th>Friday</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td><strong>Revit Intro + In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td>16</td>
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<tr>
<td></td>
<td>11</td>
<td>Quick start model; Assign bedroom sketch homework</td>
<td>Model your bedroom (bring a sketch of your bedroom plan with dimensions)</td>
<td>Add grid lines to your bedroom model; create a walkthrough of your bedroom</td>
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<tr>
<td>8</td>
<td></td>
<td><strong>Revit Project Intro</strong></td>
<td><strong>ACC Intro + In-Class Activity</strong></td>
<td><strong>ACC Intro + In-Class Activity</strong></td>
<td><strong>ACC In-Class Activity</strong></td>
<td><strong>ACC In-Class Activity</strong></td>
<td>23</td>
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<td>18</td>
<td>Determine team roles; Import 2D plans to Revit; create grid file for Revit project</td>
<td>Review Project Rubric; Create and upload central model to ACC</td>
<td>Add architectural elements (walls, floors, roof, ceilings)</td>
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<td>9</td>
<td></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td>30</td>
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<tr>
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<td>24</td>
<td>Add architectural elements (stairs, furniture, people)</td>
<td>Add structural elements (footings, columns, beams)</td>
<td>Create sheets; add views to sheets</td>
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<td>10</td>
<td>31</td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>ACC In-Class Activity</strong></td>
<td><strong>ACC In-Class Activity</strong></td>
<td>6</td>
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<td>Create section views and details; annotate details</td>
<td>Create QTO Part I - Revit</td>
<td>Create QTO Part II - Takeoff</td>
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<td>2</td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Revit In-Class Activity: Revit Project Due</strong></td>
<td><strong>Revit In-Class Activity</strong></td>
<td><strong>Virtual Reality In-Class Activity</strong></td>
<td>13</td>
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<td>Add mechanical and electrical elements</td>
<td>Link other teams’ models for completed building</td>
<td>Link other teams’ models for completed building</td>
<td></td>
<td>Walkthrough Revit models in VR</td>
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- **Individual Revit Assignments**
- **Team Project using Autodesk Docs**
- **Individual Assignment Using Autodesk Takeoff**
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Each class section models a campus building
- Class is divided into teams. Each team models one level
- Teams choose how to divide their level
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Add students to Autodesk Construction Cloud
- Create team folders
- High trust environment
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Add students to Autodesk Construction Cloud
- Create team folders
- High trust environment
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Each team has one cloud model
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Collaborate → Worksets
Team Project Using Docs
CNST 116 Computer Applications for Construction

- Final day: each team links all other teams’ levels for a complete model
Individual Assignment Using Autodesk Takeoff
CNST 116 Computer Applications for Construction

- Compare experience/numbers with Revit QTO assignment
Individual Assignment Using Autodesk Takeoff
CNST 116 Computer Applications for Construction

- Compare experience/numbers with Revit QTO assignment

FALL 2021 CNST 116
W10D2 REVIT
Quantify Takeoff [QTO]

- Today you are going to:
  - Quantify volume of concrete in the concrete footings using Revit.
  - Report the concrete quantity in cubic yards and find the total cost.
- At the end of lab, have the instructor or TA check your work.

STEPS TO COMPLETE THE EXERCISE
1. Open Revit 2022 and, in the upper right-hand corner, sign in using your Autodesk account.
2. Download the QTO Model from Bridges under Assignments → Revit QTO

QUANTIFY CONCRETE FOOTINGS
1. Open the Level 1 plan and select one of the 36” x 12” Wall Foundation Bearing Footings.
   In the Properties palette, click on Edit Type, then scroll to the bottom and add 125.00 in the cost field (see below, left). This is a UNIT cost, not a total cost (i.e., $125.00 per CY of concrete).
2. Create a new “Quantities” Schedule for the footings: View tab → Create panel → Schedules dropdown → Schedules/Quantities → Category: Structural Foundations → OK
3. In the Schedule Properties dialog box, in the Fields tab, select Volume and Cost (see below, right) → OK

FALL 2021 CNST 116
W11D1 REVIT
Takeoff using Autodesk Construction Cloud Takeoff

- Today you are going to:
  - Quantify volume of concrete in the concrete footings using ACC Takeoff.
  - Report the concrete quantity in cubic yards and find the total cost.
- At the end of lab, have the instructor or TA check your work.

UPLOAD THE MODEL TO AUTODESK CONSTRUCTION CLOUD. NOTE: TO SAVE TIME TODAY, THIS PART HAS BEEN DONE FOR YOU. STEPS BELOW ARE FOR FUTURE REFERENCE.
1. Log in to Autodesk Construction Cloud (acc.autodesk.com)
2. In the upper left dropdown, select Takeoff.
3. On the left, select Sheets & Models.
4. Click on 3D Models in the tab above “Upload Files”.
5. Click on Upload Models, then drag & drop or navigate to where your file is saved locally. Your model may take a few minutes to upload.

QUANTIFY CONCRETE FOOTINGS
6. Log in to Autodesk Construction Cloud (acc.autodesk.com)
7. In the upper left dropdown, select Takeoff.
8. Go to the Packages tool.
9. Go to settings on the right:
   - Select imperial
   - Select classification system from the dropdown (typically either Masterformat or Uniformat. Today you’ll use the Sample Assembly Classification)
10. On the left, select Packages.
11. Click on the blue “*Create Packages” button and enter the package title: FirstName_LastInitial_Concrete
12. Click on your package name in the list (on a typical project, you will see Concrete Foundations)
Lessons Learned
Faculty Reflections

- With the cloud model, only need to open one model for grading
- With access to Autodesk Construction Cloud resources (learnacc.autodesk.com), students can explore beyond the classroom assignments
- Autodesk is continually innovating
- Keeping up to date
- Support from Autodesk
- Autodesk Digital Construction Summer School
Student Comments

Working with classmates, and overall group work helped me learn the material.

Hands on experience, it wasn't just learning it through lecturing and stuff. We got to actively practice what we were learning in class.

Being in the class and using the programs helped with learning them and have easy access to someone who can answer my questions.

Dr. Anderson furnished hand out sheets that listed the objective for that class, and guided you through how to complete it and she also had a TA that helped answer questions.

It was good how we had the worksheets that gave us directions.

Everyday we got a worksheet that would get be us a step by step guide on what to do in an assignment.

I greatly appreciate the packets that were handed out. They had step-by-step processes and they were very helpful.

I like the interaction, and engaging way professor anderson ran her course. instructions were very straight forward.