Department Annual Report

2012-2013

Mechanical and Architectural Design

928 Program – Certificate in Mechanical Design
904 Program – AAAS Degree in Mechanical Design
925 Program – AAAS Degree in Architectural Technology
905 Program – AAAS Degree in Architectural Design

Document Prepared By:

Tom Boersma, Dept. Head

April 2013
Department Information

Current year goals

1. Continue to update the master notebooks.
   This project is pretty much complete except for the on-going maintenance of these notebooks.
2. Assist the first class of the LTU Integrated Design Studio (fall/2011, winter 2012) for transfer to LTU as junior status.
   Completed
3. Continue to work with students in the USGBC Student Organization to prepare for the Green Associate exam.
   Completed, exam to be held May 2013
4. Continue to test students for the CSWA exam in the fall and winter.
   Results: fall – 82%, winter – 68% (66% 3 year average)
   Begin to offer the CSWP for DR240
   Results: winter – 75%
5. Dan and Dave to co-teach AR112 with Revit MEP winter of 2013 to refine the course and train an adjunct to teach it.
   Completed – this course is now better organized and documented.
6. Teach the revised DR265 course.
   Course was cancelled this year but looks promising for next fall.
7. Offer DR240 for the first time.
   Completed – looking at some additional equipment / resources for next year.
8. Consider several new course opportunities.
   We are looking at several options for the DR279 capstone course and considering a machine design course.

Goals for next year

1. Enhance the master notebooks library with a digital library of course materials.
2. Develop a scanning curriculum for DR240.
3. Evaluate the Revit Certification exam scores and determine how the exam preparation can be enhanced.
4. Create a new brochure for both Architectural and Mechanical Design programs.
5. Complete the Ferris Construction Management transfer program.
6. Prepare DR229 for on-line delivery.
7. Prepare DR190 for hybrid delivery.
8. Begin the Program Review process for Mechanical Design.
9. Work with students on portfolios to meet the new requirements for LTU.
Internal collaborations and partnerships

The goal of DR240 was to have the students run their CAM programs in the machine shop. Due to the fact that 12:15-2:15 was a very busy time in the shop this was not possible. Next year we will run this class later in the day to make this work better with the shop schedule.

External collaborations and partnerships

1. Develop a better relationship with WMU and determine how our 904 students can transfer into their Product Design program.
2. Continue to monitor the Architectural Program being developed at Kendall to see how our students might be able to transfer there.
3. Solidify the transfer arrangement to the Ferris Construction Management program.
4. We have developed several new articulation agreements with area high schools and we will continue to add these as we make more connections with high schools with programs that offer CAD design.

Departmental needs for support from other departments within the college
We will need assistance from the promotional and public relations departments for the re-design of our brochures and the general marketing of our programs.

Program accreditation Updates
Our curriculum is current for the LTU accreditation of our 905 program.

Description of departmental advising plan and outcomes
Attached below is the general advising plan for our department. All faculty members in our department are encouraged to discuss the next semester course sign up and graduation requirements during the week before students can sign up for class. We have program check sheets available on our department web site for the students to monitor their progress. We have also encouraged the use of “My Degree Path”. The students are encouraged to set up a meeting with one of us to further review their progress. Traditionally Dave and Tom have done much of the one on one advising but now that Charlotte and Will have some experience with advising they are able to participate more fully. We feel that this advising plan is working well and that our students understand our course schedule and graduation requirements.
Updates About Student Organizations and Achievements

The USGBC student organization continues to flourish and is planning a trip to Philadelphia in November 2013.

Andrew Bifulco won a $40,000 Motor City scholarship competition from LTU.

We had 6 Mechanical design students achieve the Certified SolidWorks Professional level.
Other department updates
The new Ferris Construction Management transfer program is in its final stages of completion. We continue to work towards putting more of our courses on-line. Employment opportunities remain very strong in the mechanical design field. We routinely have a hard time getting students to even apply for all the positions for which we receive direct requests from employers. Employment opportunities for architectural students appear to be improving as well.

Faculty & Staff

Departmental Professional Development Activities (Contractual Obligations for Departmental Faculty Development/6 hours)
Department training on “My Degree Path” in the fall (2)
Department visit to WoodWays in the fall (2)

- The owner of this architectural components company showed how they have taken a very traditional manufacturing process and modernized the entire operation.

Visit to JR Automation in the Spring (2)

- Our original visit was canceled due to a snow day. Susan Lichtenberg went another time to tour the company and talk to Kevin Bowne about internship opportunities. They were very interested in forming this partnership with us. Wilfred Gooch is also following up with them.

Faculty Professional Development Activities- Year End Summary
Dave and Charlotte attended Autodesk University in November to learn more about Revit applications in architecture.

Tom attended SolidWorks World in January and received training on reverse engineering and administering the CSWP exam.

Will was not able to attend Pro-E Training because of scheduling issues. He has instead pursued an on-line version of that training.

SolidWorks self-study course materials have been purchased through Perkins for SolidWorks Event Based Simulation. This will help add to the DR240 curriculum.
Faculty Development Plans for Upcoming Year
Charlotte and Dave to participate in the USGBC National Greenbuild Conference in Philadelphia November 2013.

Will to attend Pro-E software training

Tom Boersma to attend training at SolidWorks World 2014 in San Diego January 2014

EOL/Release Time Work

None for 2012/2013

Faculty & Staff Accomplishments/Awards

Dave Dye – passed Autodesk Revit Certification exam
# Program Data - Perkins Indicators

## GRCC Perkins Core Indicator Status Update - 2012

**PERKINS III CORE PERFORMANCE INDICATORS FY 2011-12**

1P1: If there was no technical skill assessment available, please enter N/A.

<table>
<thead>
<tr>
<th>CORE INDICATOR (Perkins IV)</th>
<th>2011-2012 Performance Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State Performance Level Expected</td>
</tr>
<tr>
<td>1P1: % of CTE concentrators who passed technical skill assessments that are aligned with industry-recognized standards, if available and appropriate, during the reporting year (that can be identified)</td>
<td>91.08%</td>
</tr>
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<td>2P1: % of CTE concentrators who received an industry-recognized credential, a certificate, or a degree during the reporting year.</td>
<td>28.93%</td>
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</tr>
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<td>4P1: % of CTE Concentrators who were placed or retained in employment, or placed in military service or apprenticeship programs in the 2nd quarter following the program year in which they left postsecondary education (i.e., unduplicated placement status for CTE concentrators who graduated by June 30, 2008 would be assessed between October 1, 2008 and December 31, 2008).</td>
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</tr>
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<td>5P1: % of CTE participants from underrepresented gender groups who participated in a program that leads to employment in nontraditional fields during the reporting year.</td>
<td></td>
</tr>
<tr>
<td>23.62%</td>
<td>3.57%</td>
</tr>
<tr>
<td>5P2: % of CTE concentrators from underrepresented gender groups who completed a program that leads to employment in nontraditional fields during the reporting year.</td>
<td></td>
</tr>
<tr>
<td>20.65%</td>
<td>5.63%</td>
</tr>
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</table>
### GRCC Perkins Core Indicator Status Update – 2012

#### Program – Architectural Drafting  - 925 - 4.0901

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</table>
5P2: Student Participation in Nontraditional Fields
In the mechanical design area we need to improve these numbers. In our recruitment efforts we are trying to reach out to more females and minorities. Because many students enter this field because of the success of other family members or friends, this trend is tough to alter. For the architectural area we need to examine these numbers more closely. These numbers are surprising given the demographic of our current architectural students.

2P1: Credential, Certificate, or Degree Attainment
For the mechanical design students this appears to be very good. This number actually fell (from 25%) in the architectural area and we will attempt to improve this.
5P3: Student Completion in Nontraditional Fields
N/A

4P1: Student Placement
These numbers appear excellent.

3P1: Student Retention and Transfer
These numbers appear satisfactory.

1P1: Technical Skills Attainment
N/A

Summary
While several categories appear to be satisfactory we need to better understand the 5P1 and 2 categories so that we can try to improve them.

Curriculum

Course Improvement Projects
As we worked through our CARP updates and catalog descriptions we realized that our course descriptions lacked uniformity. We established some guidelines to make them easier to read and more descriptive of the actual course outcomes:

1. Avoid sentence fragments.
2. Use 25 – 50 words
3. Do not include credit/contact hours in the description. (It is automatically inserted in the title).
4. Include no more than 2 pre-req / co-req
5. Avoid predicting when the course will run. (This is a moving target that is better addressed in a separate page on our department web site).
6. Consider addressing prior skills or special conditions that the student should be aware of.
7. Address unique software or equipment that will be taught.

Program Improvement Projects
We are trying to develop a more “hands on” approach to learning in each of our disciplines. The AR202 course now requires architectural models and we have just recently seen the results for winter 2013. The students are applying much of what they learn in AR201/AR202 and the results have been very impressive.
The winter 2013 DR240 students are also required to develop a presentation using both a working model and the electronic animations and rendering of their projects. Again we are seeing an increased amount of student engagement as they apply their DR150/DR190/DR240 knowledge to a real project with industrial applications. As this is the first year of this
requirement we expect to see some improvement as we develop some base lines for this project.

**Course Document (CARP) Updates completed this year**

The following chart shows our CARP form update progress.

*Note: AR121 is in process and DR259 will become an obsolete course*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Update Progress</th>
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</thead>
<tbody>
<tr>
<td>AR 101</td>
<td>Building Codes and Standards</td>
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<tr>
<td>AR 103</td>
<td>Req Bldg Codes &amp; Standards</td>
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<tr>
<td>AR 111</td>
<td>Orientation to Architecture</td>
<td>X</td>
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<tr>
<td>AR 105</td>
<td>Construction Materials 1</td>
<td></td>
</tr>
<tr>
<td>AR 106</td>
<td>Construction Materials 2</td>
<td></td>
</tr>
<tr>
<td>AR 112</td>
<td>Mach &amp; Electrical Drafting</td>
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<td>AR 119</td>
<td>Architectural CAD</td>
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<td>AR 120</td>
<td>Arch Working Drawings 1</td>
<td>10/22/2012</td>
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<tr>
<td>AR 121</td>
<td>Arch Working Drawings 2</td>
<td></td>
</tr>
<tr>
<td>AR 125</td>
<td>Print Reading &amp; Specifications</td>
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<tr>
<td>AR 129</td>
<td>Architectural 3D CAD</td>
<td></td>
</tr>
<tr>
<td>AR 201</td>
<td>Architectural Graphics-1</td>
<td></td>
</tr>
<tr>
<td>AR 202</td>
<td>Architectural Graphics-2</td>
<td></td>
</tr>
<tr>
<td>AR 208</td>
<td>Design Studio - Commercial Bld</td>
<td></td>
</tr>
<tr>
<td>AR 218</td>
<td>Sustainable Residential Design</td>
<td></td>
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<tr>
<td>DR 212</td>
<td>Tool Design</td>
<td>8/1/2012</td>
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<td>DR 258</td>
<td>Intro to Pro-Engineering</td>
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<tr>
<td>DR 140</td>
<td>Introduction to Inventor</td>
<td>4/10/2013</td>
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<tr>
<td>DR 150</td>
<td>Introduction to SolidWorks</td>
<td>4/27/2012</td>
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<tr>
<td>DR 180</td>
<td>Intro to Mechanical Concepts</td>
<td>12/6/2012</td>
</tr>
<tr>
<td>DR 190</td>
<td>Intermediate Solidworks</td>
<td>7/19/2012</td>
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<tr>
<td>DR 224</td>
<td>Die Design</td>
<td>8/1/2012</td>
</tr>
<tr>
<td>DR 225</td>
<td>Advanced Die Design</td>
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<tr>
<td>DR 229</td>
<td>Detail Drafting</td>
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<tr>
<td>DR 240</td>
<td>Advanced SolidWorks</td>
<td>2/28/2012</td>
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<tr>
<td>DR 241</td>
<td>Mold Design Theory</td>
<td>12/12/2012</td>
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<tr>
<td>DR 269</td>
<td>Advanced Part Design and Sheet</td>
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<tr>
<td>DR 260</td>
<td>Introduction to Catia</td>
<td>4/10/2013</td>
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<tr>
<td>DR 265</td>
<td>Intro to Design with Surfaces</td>
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<td>DR 279</td>
<td>Team Design Project</td>
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<tr>
<td>EG 206</td>
<td>Statics</td>
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<tr>
<td>EG 212</td>
<td>Dynamics</td>
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<tr>
<td>EG 215</td>
<td>Mechanical Vibrations</td>
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<tr>
<td>EG 110</td>
<td>Industrial Graphics With CAD</td>
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<tr>
<td>EG 201</td>
<td>Adv Engineering Graphics</td>
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</tr>
</tbody>
</table>

**Assessment of Student Learning**

**Program Learning Outcome(s) assessed this year – Mechanical Design**

“The student will generate an industrial tool design based on a given part print, machine tool specification, and production requirements.”
Measures of Student Learning
This rubric was created to assess the work of a student in the 3rd (of 5) design project for the semester. This will generally help us determine how close our entire class is to generating a commercially acceptable tool design. More specifically this will show the variation between the students and further identify the topics they struggle with.
Assessment Project for DR212 Tool Design
Winter 2013
Tom Boersma

The goal of this assessment project is to establish a competency baseline for Mechanical Design (904) program students. DR212 is typically a second semester course where the students are applying their engineering graphics skills to the design of a typical industrial tool. The designs used in this study are of a typical machining fixture used on a CNC mill to produce parts per blueprint specification. Each category is rated on a scale from 1 to 10 with 10 being the highest score. The score is averaged between the instructor and a second evaluator – in this case the department head. A comment section is added to describe any special circumstances regarding that particular student sample.

Student number: _____________

Ev. 1  Ev. 2  Ave.

Part 1: Engineering Graphics

1. Border, title block, notes
2. Orthographic view layout, use of drawingspace
3. Dimensioning
4. Line type, line weight, fonts, notes
5. Professional drawing appearance

Part 2: Tool Design

6. Locators are properly applied per datums
7. Clamps: against locators, properly sized, ease of use
8. Standard components are correctly specified in BOM
9. Material stock sizes in Bill of Materials
10. Tolerances applied as needed

Comments: ____________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

Final Assessment: _____

Initial Data and Findings
Final Scores (averaged between 2 evaluators)
34, 64, 66, 56, 30, 50, 46, 50, 76, 66, 49
N=11, average score 53.3
Highest ranking categories: Locators and clamps
Lowest ranking categories: Tolerances, Material stock sizes

Curricular or Pedagogical Changes Implemented
This is the first time that we have performed this assessment. We will use this data to improve on both our instructional methodologies and assignment specifications for next year.

Data and Findings (post improvement/change)
While EG110 or equivalent is a prerequisite for this class it appears that many students need a review of good mechanical drawing procedures in this class. Perhaps 5 major designs are too many for this class and they need to do a more thorough job on fewer designs. Also a score of 100 is based on industry standards for this type of design. We realize that few students could attain this standard in the middle of this first tool design course. Certainly we see room for improvement.

Program Learning Outcome(s) assessed this year – Architectural Design
This was for the evaluation of the AR 218 Class - Sustainable Residential Design that was done during the Winter 2013 semester.

There were 7 single family house projects completed and presented to Habitat for Humanity of Kent County.

Each project was evaluated in 14 different areas.

Measures of Student Learning

The following rubric was used to evaluate the ability of architectural students to utilize their skills in completing an entire house design.
**Initial Data and Findings**

AR 218 – Sustainable Residential Design - Final Review – Points Listing for Final House Project

How well did each team do? Maximum score 300 points. Winter 2013 Semester

Projects Presented to Habitat for Humanity of Kent County

<table>
<thead>
<tr>
<th>Groups/Individuals</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Time</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>5</td>
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<tr>
<td>Presentation</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Square Footage</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Design of House</td>
<td>16</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Code &amp; Zoning Reqs</td>
<td>20</td>
<td>17</td>
<td>17</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Graphics</td>
<td>17</td>
<td>14</td>
<td>20</td>
<td>12</td>
<td>14</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

**Completeness - Drawings**

| A000 Rendering Sheet | 20  | 20  | 20  | 20  | 20  | 20  | 6   |
| A001 Plot Plan       | 18  | 13  | 17  | 20  | 20  | 20  | 13  |
| A100 First Floor Plan| 28  | 34  | 40  | 23  | 40  | 40  | 40  |
| A101 Second Floor Plan| 20  | 20  | 20  | 20  | 20  | 20  | 20  |
| A102 Basement        | 20  | 17  | 20  | 10  | 20  | 20  | 10  |
| A103 Kitchen/Schedules| 20  | 10  | 20  | 10  | 17  | 20  | 0   |
| A200 Elevations      | 18  | 12  | 20  | 12  | 20  | 20  | 12  |
| A300 Section and Stairs| 25  | 18  | 20  | 25  | 20  | 23  | 0   |
| Total Points (Of 300)| 267 | 240 | 279 | 234 | 281 | 293 | 180 |

**Summary of 7 Projects Presented – Potential 300 Points**

Highest Score = 293  
Lowest Score = 180  
Average Score = 253  
Median Score = 267

**Curricular or Pedagogical Changes Implemented**

This was the first attempt at this assessment so no curricular changes were implemented during this study.

**Data and Findings (post improvement/change)**

Project to be continued