

Major Assessment Findings and Curricular Improvements School of Architecture and Planning

Bachelor of Science in Architecture (Pre-professional) AY2008-09 through AY2012-13

Assessment Measures

Context

The School of Architecture and Planning conducts no independent comprehensive exams, but assesses learning outcomes at the undergraduate level within the context of its *Comprehensive Building Design (CBD)* curriculum comprised of a *Studio* (CBDS – ARPL 402) and a *Supplement* (CSS – ARPL 422).

In this capstone curriculum, students are tested on their mastery of subjects learned in their professional studies through performance designing a project for a local real estate firm that could be or is actually considering building such a project. The courses are organized in a way intended to simulate the work environment of architectural practitioners, and therefore comes with professional performance expectations. It functions as a capstone for the accredited program – the four-year B.S.Arch program and the first two years of the M.Arch3 program.

The studio focuses on a rigorous semester-long team project that requires development of urban design, architectural design, construction systems, environmental systems, structural systems, and building envelope for a project with a moderately complex program. The studio component stresses collaboration among members of each student design team and with outside professional consultants. Client interaction is also stressed. Practitioners role-playing the clients come in to discuss the project at the beginning of the semester and come to the major reviews to give student teams feedback.

Although the building as a whole is designed in teams, each student is required to design, in detail, one part of the building from foundation to roof, from one column to the next, and from the exterior wall to about ten feet inside the building, and one infrastructural system (structure, heating/cooling, lighting, plumbing, etc.) for the entire building. This way, students demonstrate their understanding of construction, structural, and infrastructural systems, of the coordination of those systems, and of building envelope.

As CBDS and CSS are required courses, enrollment numbers are determined by the size of the current rising second-semester senior class as well as students enrolled in the two M.Arch programs who are also required to take it unless they did so as an undergraduate at CUA.

These courses have seen three different directors with the following duration of leadership: 2008 – 2010; 2010 – 2011; and 2011 – 2013.

The Building Design (CBDS: ARPL 402)

In the *Studio*, instructors work in very much a one-on-one relationship with students, guiding ten to twelve students each during twelve contact hours per week, enabling the instructors to see and evaluate the quality of each student's contribution to the team project and each student's level of achieved competency. The projects are completed in teams much like an architecture project would be completed in professional practice and are evaluated as a whole through team presentation in a juried format.

The Systems and Detail Design (CSS: ARPL 432)

In the *Supplement*, students attend three hours per week of lectures on topics relevant to their studio work for roughly the first half of the semester and then have consultations with practicing architects, engineers, and other consultants for roughly the second half. The detail and systems designs contributed to the team project by each student are evaluated through the critic's qualitative evaluations and through oral examination.

At the end of the studio, before the final presentation, the CBDS faculty administers the oral defenses, one-on-one with individual students. They assess how much each student understands the various disciplines involved in the

project design, as well as the comprehensive whole. We conduct Architectural, Sustainable, Structural, Mechanical, Electrical, and Plumbing Systems oral defenses each year.

Assessment Tools

Individual assignments are assessed using the criteria listed below, scored with a numerical scale of 1 (below expectations); 2 (met expectations); 3 (exceeds expectations); 4 (was exceptional), at the following Process Steps:

Process Step 1: Grade given after Pre-Design Review based on the following criteria:

- Pre-Design: Analysis and Iterative Studies
- Concept: Completeness and Clarity; Content; Conceptual Strength
- Project Directory

Process Step 2: Grade given after Schematic Design Review based on the following criteria:

- Formal and Technical quality of Schematic Design
- Schematic Design Documents
- Quality of the story and images
- Level of insight in the assessment
- Interaction with fellow students, faculty, and guests

Process Step 3: Grade given after 30% DD review based on the following criteria:

- Completeness and Graphic quality of axons
- Design quality of system designs shown in axons
- Compatibility with pre-design work
- Organization and Completeness
- Consistency with and furtherance of design concept
- Graphic Quality
- Level of insight in the assessment.

Process Step 4: Grade given after 60% DD pin-up based on the following criteria:

- Organization and Completeness
- Consistency with and furtherance of design concept.
- Graphic Quality
- Correlation to design concept
- Connections: gravity, uplift and wind/lateral load
- Weather: thermal transfer, water penetration and vapor condensation
- Other environmental: acoustic transfer and fire spread
- Constructability

Process Step 5: Grade given after Final Review based on the following criteria:

- Organization and Completeness
- Consistency with and furtherance of design concept
- Graphic Quality
- Correlation to design concept
- Connections: gravity, uplift, and wind/lateral load.
- Weather: thermal transfer, water penetration, and vapor condensation
- Other environmental: acoustic transfer and fire spread
- Constructability: sequence and tolerances
- Final Presentation Boards
- Conceptual Rigor Evidence

In addition to the criteria identified for each assignment, studio faculty assess students on their level of engagement/class participation, ability to collaborate effectively with their peers, attendance, craft, and respect for their work.

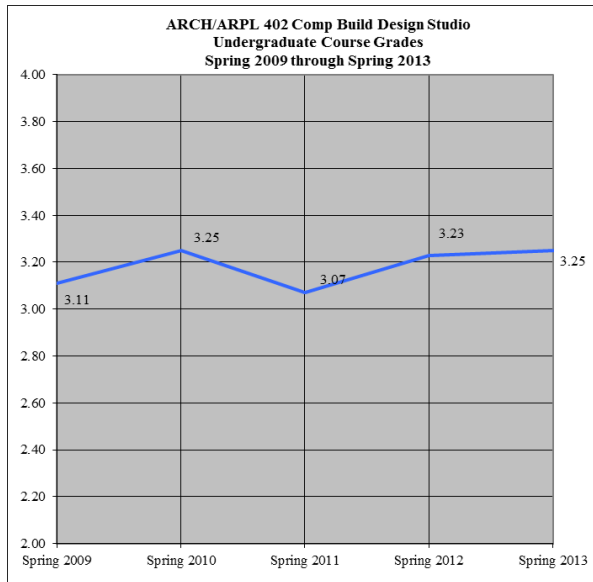
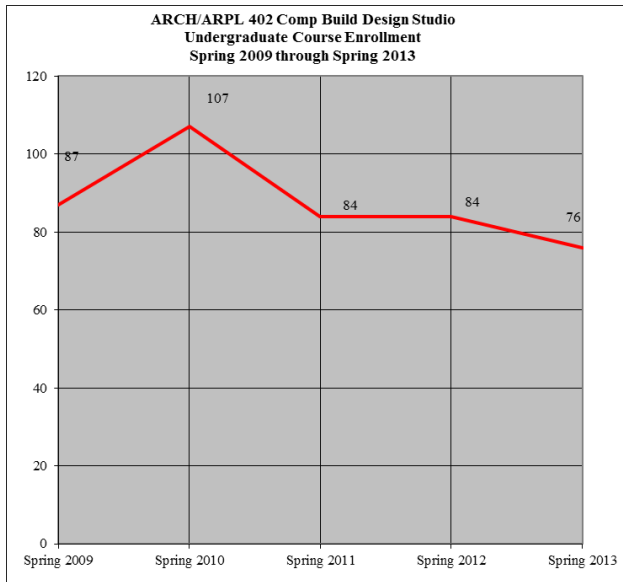
Assessment Data

Course grades, evaluations, and enrollment data in both *Comprehensive Building Design Studio* and *Comprehensive Building Design Studio Supplement* were documented for a five-year period (Fall 2008 through Fall 2012). The basic data that our self-assessment of the last five years produced include the following:

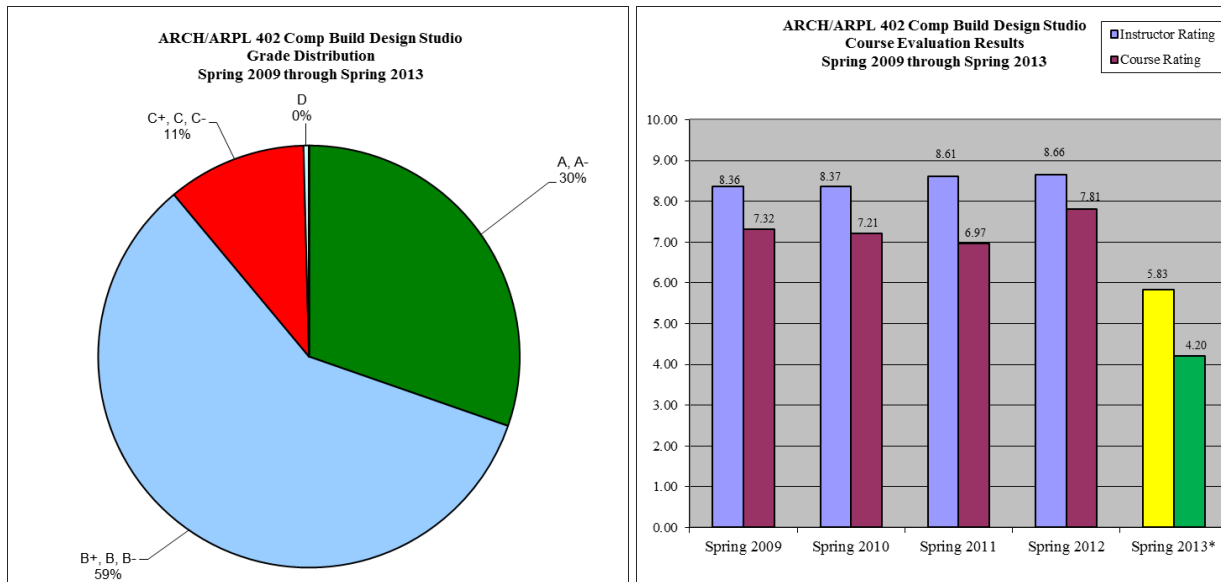
COURSE SUMMARY DATA ARCH/ARPL 402 Comprehensive Building Design Studio

Term	UG Course Enrlmt	Course Grades										Course Evaluation Results						
		Course Grade		Grade Distribution								Course Eval		Instructor Rating		Course Rating		
		Avg	StDev	A	B+	B	C+	C	C-	D	F	W	I	#	%	Avg	StDev	Avg
Spring 2009	87	3.11	0.51	20	61	4	2						25	28.74%	8.36	1.29	7.32	1.82
Spring 2010	107	3.25	0.47	37	65	4	1						19	17.76%	8.37	1.50	7.21	1.87
Spring 2011	84	3.07	0.57	18	52	13	1						31	36.90%	8.61	1.69	6.97	2.24
Spring 2012	84	3.23	0.55	28	48	8							59	70.24%	8.66	1.90	7.81	2.11
Spring 2013	76	3.25	0.47	28	43	5							33	43.42%	5.83	1.94	4.20	1.92

*Spring 2013 used a different evaluation form, in which instructors and courses are rated on a 7-point scale



Enrollment data is primarily a function of class size, which is not a product of course effectiveness. Grades have not significantly varied in the last five years.



These data show that 89% of the students received grades in the A or B ranges. The graph shows no students receiving grades lower than C-, but the table shows that 4 students did receive grades of D, though none since 2011. At no time did any students receive a grade of F, but it is worth noting that school policy counts a grade of D as failing. This suggests that all of the students have achieved competency in their undergraduate studies, if at varying levels, with the vast majority doing work that is above expectations.

Course evaluations show a significant drop in 2013, with 43% of students having turned in evaluations. This is understood as a function of changing the evaluation scale from one with a maximum rating of 10 to one with a maximum rating of 7. With that change, a 10-point rating of 8.30 translates to a 7-point rating of 5.81; a 7.25 translates to a 5.075.

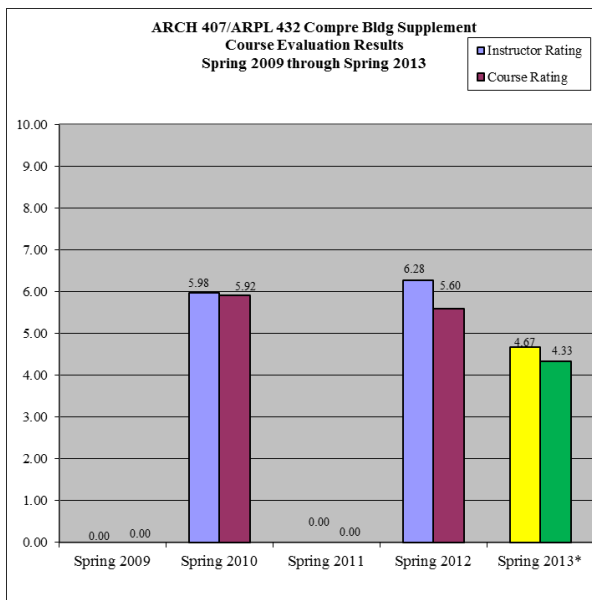
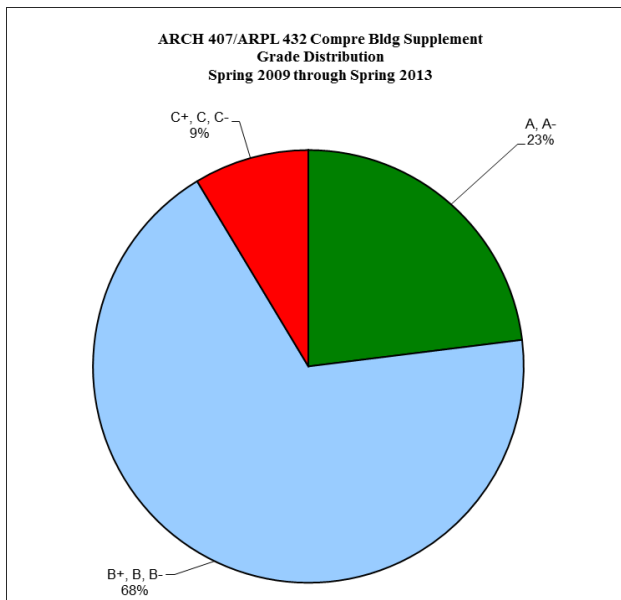
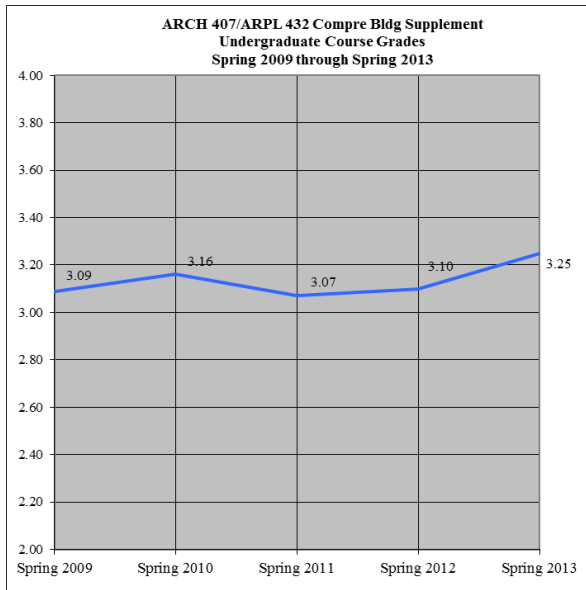
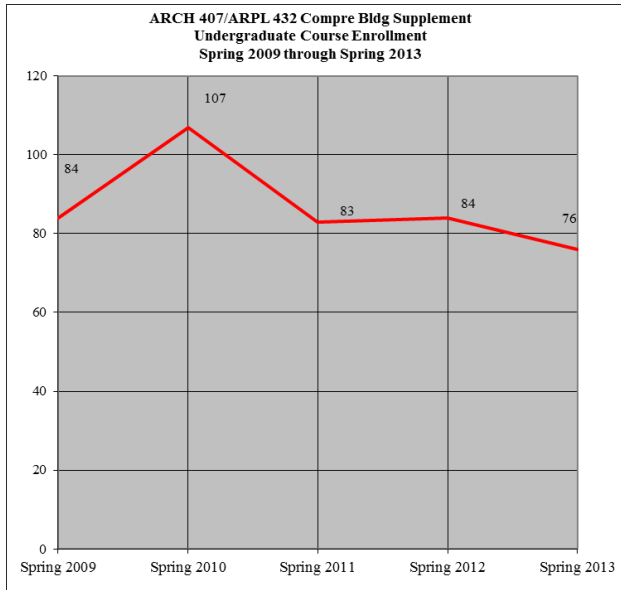
With this understanding, there is no significant change in the 2013 instructor evaluations, but the course evaluations, at 4.20, are significantly lower. We think this suggests that...

In addition, the fact that instructors are receiving significantly higher ratings than the course, in every year, suggests that...

COURSE SUMMARY DATA ARCH 407/ARPL 432 Comprehensive Building Design Studio Supplement

Term	GR Course Enrlmt	Course Grades									Course Evaluation Results								
		Course Grade		Grade Distribution							Course Eval		Instructor Rating		Course Rating				
		Avg	StDev	A	B+	B	C+	C	C-	D	F	W	I	#	%	Avg	StDev	Avg	StDev
Spring 2009	84	3.09	0.44	19	59	6							0	0.00%					
Spring 2010	107	3.16	0.29	8	96	3							66	61.68%	5.98	2.30	5.92	2.46	
Spring 2011	83	3.07	0.50	13	61	9							0	0.00%					
Spring 2012	84	3.10	0.46	15	62	7							53	63.10%	6.28	2.66	5.60	2.84	
Spring 2013	76	3.25	0.47	28	43	5							60	78.95%	4.67	1.85	4.33	1.86	

*Spring 2013 used a different form that evaluated instructors and courses on a 7-point scale.



The data for CBDSS follow the pattern of CBDS. There were no D or F failures at all. Course grades in the most recent year are at a five-year high.

Course evaluations are missing for two of the five years, most likely due to turnover in the program’s faculty coordinator. For the data we have, we note that the difference between instructor and course ratings is fairly minimal, which makes sense. On the other hand, instructor and course ratings are significantly lower for CBDSS than for CBDS. We have no hard data on the reasons for this difference, but suspect that it might be a function of:

- Differences between the course formats and objectives: CBDS has a studio pedagogy and, as such, involves learning by doing, with a relatively subjective focus on compositional design, whereas CBDSS has a lecture pedagogy in the first half of the semester followed by technical criticism leading to oral exams in the second half, and has a relatively objective focus on functional design.
- The notion that CBDSS is a Supplement, a less important element than and maybe even a distraction from CBDS.

- A management approach to CBDSS that is less stable than CBDS, with lectures or consultant workshops that are sometimes rescheduled with minimal notice, with constantly changing instructors and critics, and that come at times when students are not yet prepared for them, even if the lack of preparation was due to students decisions regarding work priorities.
- Possibly a similar set of perceptions of the value of CBDSS on the part of CBDS instructors that is communicated, even if not intentionally, to the students.

We have not conducted any surveys or investigations to try to confirm any of these possibilities, and none are currently planned.

National Survey of Student Engagement (NSSE) DATA

Perceptions of General Education Outcomes by Majors

Each spring, the School of Architecture and Planning uses the National Survey of Student Engagement (NSSE) to benchmark the general education outcomes of its senior students against senior students enrolled in: Catholic University, Carnegie Peers, and the entire NSSE participant group. The findings of the past five year period (Fall 2008 through Fall 2012) are documented on the charts on the following pages.

**2013 National Survey of Student Engagement Mean Comparisons:
Selected Catholic University General Education Goals
School of Architecture and Planning: Seniors**

School of Architecture and Planning compared with:

General Education Goals: Graduates will demonstrate proficiency in oral and written communication, including argumentative essays, research papers, presentations, and creative and collaborative work employing a variety of media.

**School of
Architecture and
Planning**

Catholic University

Carnegie Peers

NSSE 2013

Mean^a

Mean^a

Sig^b

*Effect
Size^c*

Mean^a

Sig^b

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Size^c*

Mean^a

Sig^b

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Size^c*

During the current school year, about how much writing have you done? 1=none, 1.5=1-2, 4=3-5, 8=6-10, 13=11-15, 18=16-20, 23=more than 20

Number of papers, reports, or other writing tasks up to 5 pages	6.0	8.4	-.37	7.2	-.19	7.9	-.28
Number of papers, reports, or other writing tasks between 6 and 10 pages	4.0	4.3	-.07	3.1	.23	3.7	.08
Number of papers, reports, or other writing tasks 11 pages or more	5.0	2.4	.79	1.9	.91	2.0	.81

To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas? 1=very little, 2=some, 3=quite a bit, 4=very much

Writing clearly and effectively	3.0	2.9	.15	3.0	.03	3.1	-.07
Speaking clearly and effectively	3.6	2.9	*	.79	2.9	*	.73

School of Architecture and Planning compared with:

General Education Goals: Graduates will show facility in critical thinking and reasoned analysis.

**School of
Architecture and
Planning**

Catholic University

Carnegie Peers

NSSE 2013

Mean^a

Mean^a

Sig^b

*Effect
Size^c*

Mean^a

Sig^b

*Effect
Size^c*

Mean^a

Sig^b

*Effect
Size^c*

During the current school year, how much has your coursework emphasized the following mental activities? 1=very little, 2=some, 3=quite a bit, 4=very much

Memorizing course material	2.3	2.7	-.48	2.8	-.52	2.7	-.45
Applying facts, theories, or methods to practical problems or new situations	3.0	3.1	-.08	3.1	-.18	3.2	-.19
Analyzing an idea, experience, or line of reasoning in depth by examining its parts	3.0	3.1	-.12	3.1	-.11	3.1	-.14
Evaluating a point of view, decision, or information source	2.7	3.0	-.36	2.9	-.22	3.0	-.33
Forming a new idea or understanding from various from various pieces of information	3.3	2.9	.39	2.9	.42	3.0	.35

To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas? 1=very little, 2=some, 3=quite a bit, 4=very much

Thinking critically and analytically	3.5	3.2	.35	3.3	.25	3.3	.23
Analyzing numerical and statistical information	2.4	2.5	-.08	2.9	-.50	2.8	-.45
Solving complex real-world problems	3.3	2.7	.50	2.8	.45	2.8	.44

**2013 National Survey of Student Engagement Mean Comparisons:
Selected Catholic University General Education Goals
School of Architecture and Planning: Seniors**

School of Architecture and Planning compared with:

General Education Goals: Graduates will demonstrate an understanding of scientific and quantitative reasoning.	School of Architecture and Planning	Catholic University		Carnegie Peers			NSSE 2013				
		Mean ^a	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c
		<i>To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas? 1=very little, 2=some, 3=quite a bit, 4=very much</i>									
Thinking critically and analytically	3.5	3.2		.35	3.3		.25	3.3		.23	
Analyzing numerical and statistical information	2.4	2.5		-.08	2.9		-.50	2.8		-.45	
<i>During the current school year, about how often have you done the following? 1=never, 2=sometimes, 3=often, 4=very often</i>											
Reached conclusions based on your own analysis of numerical information	2.6	2.5		.14	2.7		-.07	2.6		-.03	
Used numerical information to examine a real-world problem or issue	2.5	2.4		.14	2.4		.08	2.4		.08	
Evaluated what others have concluded from numerical information	2.4	2.4		.02	2.4		-.05	2.4		-.01	

School of Architecture and Planning compared with:

General Education Goals: Graduates will demonstrate an ability to find information effectively using appropriate resources and technologies, critically assess the validity and relevance of that information, and utilize it in ethical and legal ways.	School of Architecture and Planning	Catholic University		Carnegie Peers			NSSE 2013				
		Mean ^a	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c
		<i>In your experience at your institution during the current school year, about how often have you done each of the following? 1=never, 2=sometimes, 3=often, 4=very often</i>									
Combined ideas from different courses when completing assignments	2.9	2.9		-.03	3.0		-.15	3.0		-.13	
Connected your learning to societal problems or issues	2.8	2.8		.00	2.8		.01	2.9		-.07	
Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments	2.6	2.7		-.09	2.6		.03	2.7		-.10	
Connected ideas from your courses to your prior experiences and knowledge	3.5	3.3		.30	3.2		.37	3.3		.32	

**2013 National Survey of Student Engagement Mean Comparisons:
Selected Catholic University General Education Goals
School of Architecture and Planning: Seniors**

School of Architecture and Planning compared with:

General Education Goals: Graduates will demonstrate knowledge of and respect for different cultures and religions.	School of Architecture and Planning	Catholic University			Carnegie Peers			NSSE 2013		
	Mean ^a	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c	Mean ^a	Sig ^b	Effect Size ^c
<i>In your experience at your institution during the current school year, about how often have you done each of the following? 1=never, 2=sometimes, 3=often, 4=very often</i>										
Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments	2.6	2.7		-.09	2.6		.03	2.7		-.10
Had discussions with people of a race or ethnicity other than your own	3.3	3.0		.41	3.1		.23	3.1		.24
Had discussions with people with religious beliefs other than your own	3.0	2.7		.30	3.0		-.03	3.0		-.04
<i>During the current school year, about how often have you done each of the following? 1=never, 2=sometimes, 3=often, 4=very often</i>										
Tried to better understand someone else's views by imagining how an issue looks from his or her perspective	3.2	3.0		.31	2.9		.36	3.0		.30
<i>To what extent does your institution emphasize each of the following? 1=very little, 2=some, 3=quite a bit, 4=very much</i>										
Encouraging contact among students from different social, racial/ethnic, religious backgrounds	2.6	2.2		.43	2.5		.09	2.6		.04
<i>To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas? 1=very little, 2=some, 3=quite a bit, 4=very much</i>										
Understanding people of other racial and ethnic backgrounds	3.1	2.7		.44	2.7		.39	2.8		.32

Assessment Findings

Findings regarding the five-year data shown above for course grades, evaluations, and enrollment data in both *Comprehensive Building Design Studio* and *Comprehensive Building Design Studio Supplement* include the following:

Student performance in CBDS has improved in the last two years with the integration of professional consulting firms from the leaders in the local architectural community. Between 2011-12 and 2012-13, team sizes were reduced with positive results. Student teams were more efficient in their time management and the level of work across the board has improved. Specific technically-oriented workshops were implemented this current year and this has also yielded higher level of student performance.

The observations we have made and conclusions we have drawn from all this information include the following:

- Course evaluation results over the past five years indicate the following: This studio is demanding and requires students to work in teams for the duration of the term. Working in teams draws the highest number of complaints from the students and may lead to a lower evaluation of the course as a whole. The intense nature of the studio project as a capstone also can contribute to the lower evaluation. This has been the case fairly consistently over the past five years. Recently, student evaluations indicate the course structure was better organized to ensure a higher probability of successful completion of the studio project. While the introduction of consulting partnering firms from the professional community supported the student project development overall, feedback included a desire to have more technically focused workshops with consulting engineers and technical architects. In comparison to the previous year, students appreciated the smaller scale of the design project but felt that they were not able to adequately address the large landscape component of the program. Student feedback also included a recommendation to consider smaller team structures and/or allow students to self-select.
- Student judgment of *CBDS* and *CBDSS* as a co-taught set of courses was generally favorable about the joint nature of *CBDS* and *CBDSS*. Consistent criticism was directed towards supplemental lectures that did not relate specifically to their project; was repetitive to information they were receiving in other classes; and the number of lectures which took away from time to work collaboratively in the studio. Having the classes jointly offered gave students the additional time with their studio critic, with the consulting firms, and/or with their teammates. Students wanted to see more technical workshops with the consulting engineers and architects focused on their project rather than the more broadly defined ones offered in 2012- 13. They felt it was difficult to apply the abstract concepts to the tangible design problem at hand.

Overall, in the **general education** areas, seniors in the School of Architecture and Planning hold consistent views of their proficiency to the comparative groups of Catholic University as a whole, Carnegie peers, and the NSSE 2013. The mean deviation in most areas falls within a tenth of a point from the comparative groups.

The one identified area of significance difference falls under the category "Speaking Clearly and Effectively." Our seniors' mean falls at 3.6, whereas the comparative groups are all at 2.9. The reason for this deviation may be due the nature of the architectural design studio presentations. At various times over a term, students are required to verbally present their projects to an outside jury panel. Inevitably, their skills in public speaking will improve and affect other classes outside the School of Architecture and Planning which require verbal presentations.

Curricular Improvements

Improvements to the CBDS/CBDSS program already implemented

Size and complexity of projects: For the past two years, the project was a reasonable size, but the students indicated, in 2012, the large landscape component was too difficult and they were unprepared. The project size at 18,000sf was successful. This current year (2013), the site parameters were more tightly defined.

Consulting professional partners: This past year, the studio fostered more direct relationships with the local professional community to assist students in developing the design project proposals. We have continued this relationship and have expanded the consulting partnering firms from the original four to the current six.

Planned future improvements

Curricular changes: We have undergone curriculum changes however students do not seem as well prepared for the scope of the capstone studio as in past years. Perhaps the scope needs to be redefined to reflect the change in the curriculum. This year also, there continued to be disparity among students related to preparedness and knowledge of computer programs. Knowledge in sustainability issues was thin and needs to be addressed earlier in the curriculum to ensure students entering this final studio are prepared.

Revision of the technical design curriculum: Although the building technology sequence has been revised, students are still struggling with detailing building assemblies. The studio also engaged the building technology faculty to interact more directly with the studio as “floating consultants” as students engage in the development of the design project. We will continue to partner with the professional community to assist the students in building technology into their design proposals.

Issues related to sustainability are still not fully integrated in the students’ design proposals. We will look to improve integration of sustainability in the CBDS but this issue needs to be addressed in the full curriculum.

Collaborative team structures: We will review the possibility of streamlining the team sizes. This past year as well previous ones, personal issues often compromised achieving the desired learning objectives. We will consider smaller team sizes, the possibility of eliminating teams, and/or allowing students to self-select.