The Following Three Integrated Program Variables Steer the Construction Management Program's Assessment Platform in the Department of Civil & Architectural Engineering and Construction Management (CAECM) Department at the University of Wyoming.

Mission

The mission of the Department of Civil and Architectural Engineering and Construction Management at the University of Wyoming is:

- To educate and prepare Civil and Architectural Engineering and Construction Management students to lead as designers, builders, project managers and entrepreneurs as it relates to the sustainable built and natural environments.
- To develop technical solutions through research, innovation, and improved infrastructure to diversify and grow the economies that serve Wyoming and the world.

Program Educational Objectives:

- Enhance the Civil and Architectural Engineering ABET-accredited undergraduate programs and develop an ACCE- Accredited Construction Management program.
- Promote innovative teaching and learning methods.
- Recruit and retain outstanding faculty and staff.
- Increase the number of highly productive MS and PhD graduates in the Civil and Architectural Engineering programs. In the future, pursue a graduate program in Construction Management.
- Sustain and enhance extension and outreach activities.
- Involve professionals in our hands-on teaching, research, and workforce development activities.
- Increase capacity to develop technical solutions to support infrastructure, industry, and individuals
- Foster diversity within all our programs

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Program (Student) Learning Outcomes

Upon graduation from the Construction Management program at the University of Wyoming, a graduate shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multi-disciplinary team.
10. Apply electronic-based technology to manage the construction process.
11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.

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These Integrated Program Variables are measured on a Regular Basis through the Following Listed Program Assessment Measures.

Assessment Tool	Assessment Description	Frequency
1 Graduates Survey		
Focuses on program strengths, weaknesses, additional suggestions, and program objectives.	Assessment findings are based on a Likert Scale in support of ACCE SLO mastering.	Yearly
2 Senior Exit Interview		
Focuses on individual and group feedback in support of student suggestions for improving the program.	Assessment findings are drawn from a group interview based on open ended questions for suggestions.	Yearly
3. Employer Survey (Internships)		
Focuses on Program Objectives as viewed from an employer's platform.	Assessment findings are based on a Likert Scale in support of program objectives.	Yearly
4. Alumni Survey		
Survey will be administered to graduates two years after graduation. Will focus on how well they can apply what they learned in their profession.	Assessment survey will focus on the program objectives and how well students feel they were prepared for success in the field.	Yearly Spring 2024
5 Pre/Post Course Evaluation		
Administered to students at the beginning of each course to determine their level of understanding before and after a course has been taught.	Assessment findings are based on the student learning outcomes for each class	Every Semester
6 Student Work		
Administered during every semester in the form of Assignments, Tests, Quizzes, Lab Reports, and Projects. Focuses on how well students comprehend course material.	Assessment findings are based on student work in all CM related courses	Every Semester
7 National AIC Exam		
The National AIC exam is a requirement for all senior students to take that focuses on ACCE SLO competencies.	Assessment findings are based on the AIC exam, required for all senior students.	Yearly
8 Professional Certificates		
Multiple integrated industry certificates are required by all CM students	Assessment is based on the acquiring of these certificates	Yearly
9 Teaching with Industry (TWI)		
Industry Practitioners are part of every CM course offered in the program.	Course input from practitioners is integrated by instructors of record every time a course is taught.	Every Semester

10 Industry Advisory Board		
IAB Board members engage in the strategic mission and vision of the program.	The IAB meets twice a year with direct feedback on trends in the industry as it relates to student learning outcomes.	Twice Yearly

The Following Video Tutorial Provides a Brief Overview on a Software Program that was written to Support the CM Program in its Assessment Mission.

Programmable Assessment Matrix Video Link:

https://use.vg/xDsQog

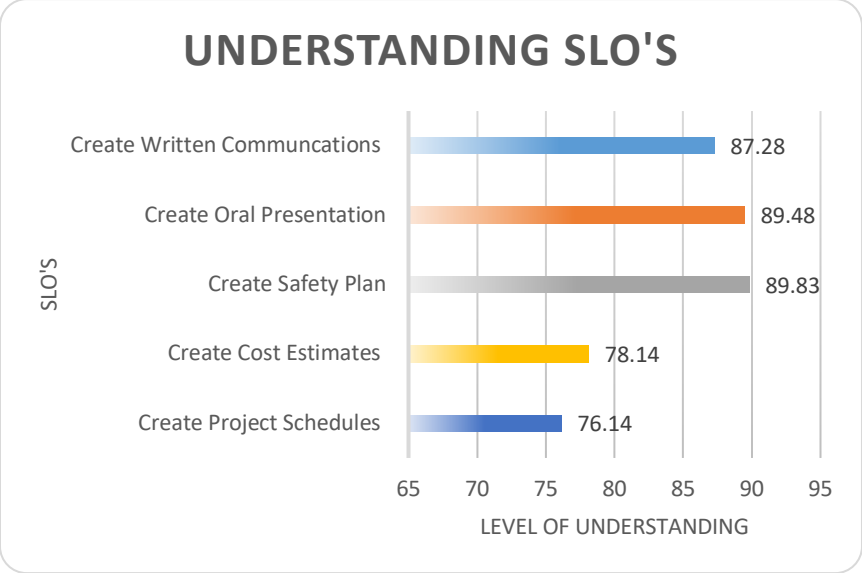
The Following Listed Program Assessment Measures, Information Obtained from the Measures, and Action taken as a Result of the Collected Data is Represented Following:

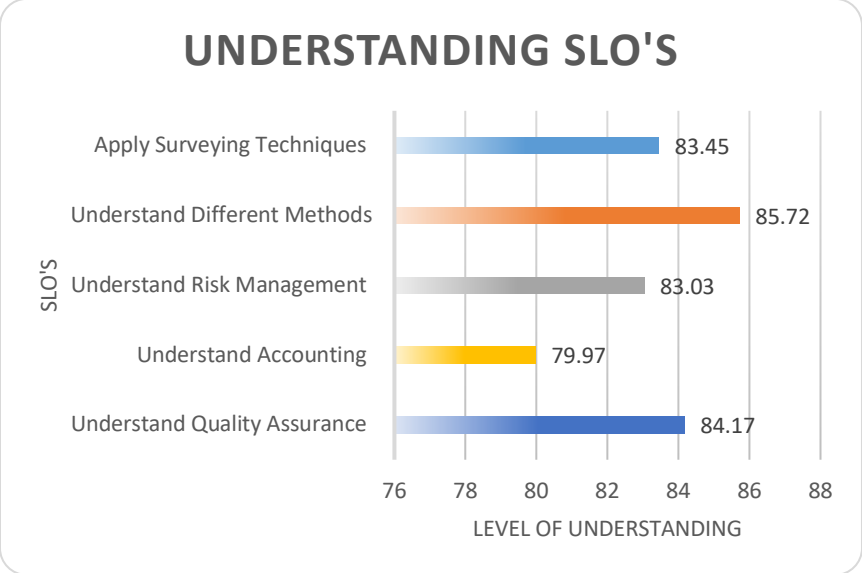
1 Graduates Survey		
Focuses on program strengths, weaknesses, additional suggestions, and program objectives.	Assessment findings are based on a Likert Scale in support of ACCE SLO mastering.	Yearly

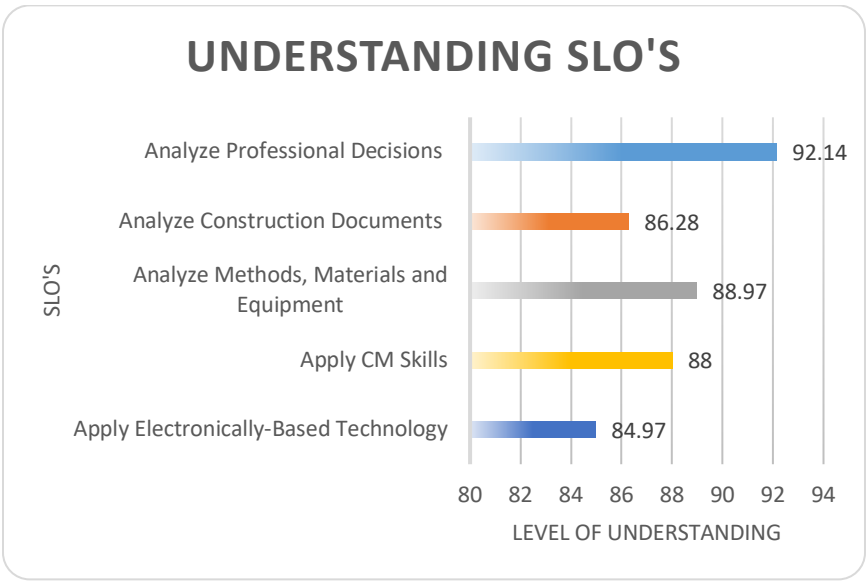
Access to the Graduate Survey can be obtained by scanning this QR code:

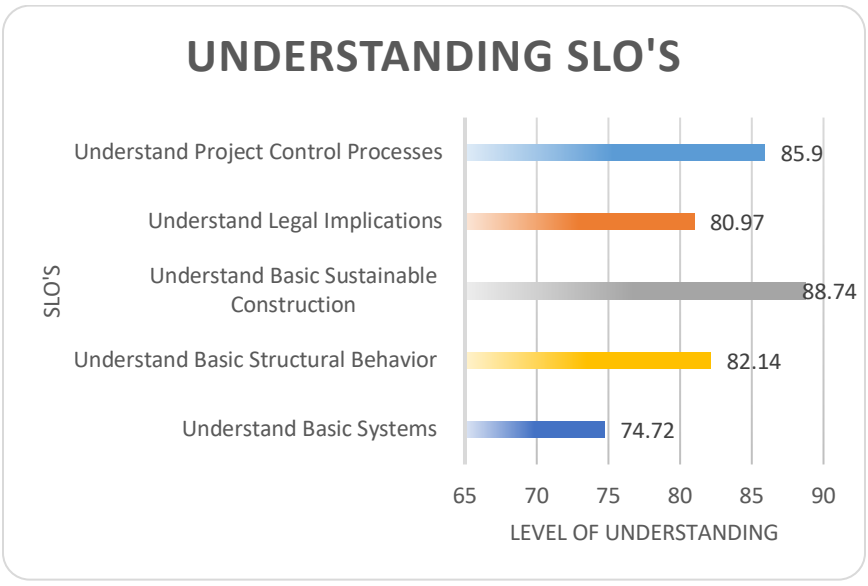
Information Obtained:

Below is a representation on student feedback, on how well they perceive their learned knowledge as it relates to the following program SLO's.









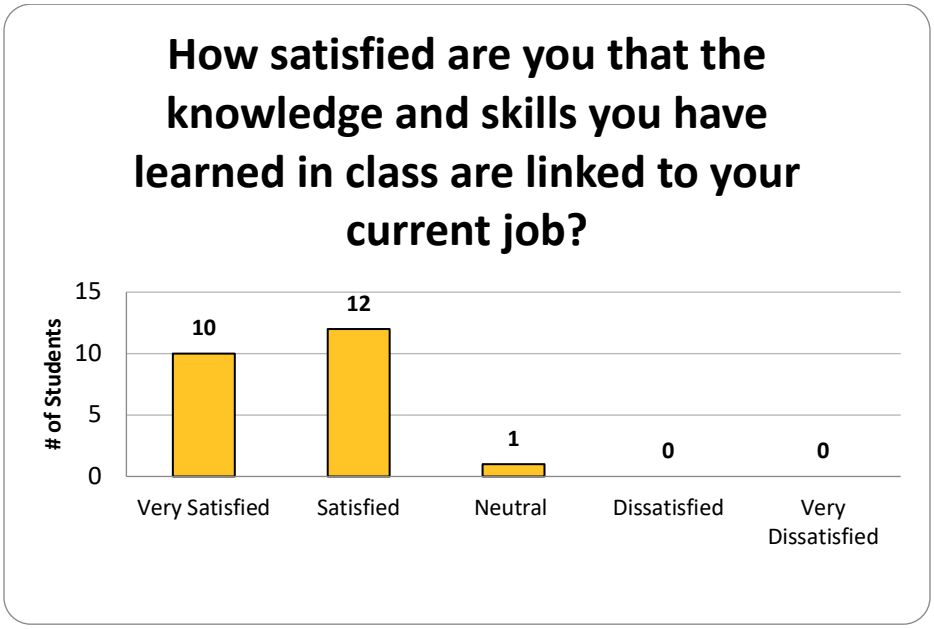
Action Taken as a Result of the Collected Data:

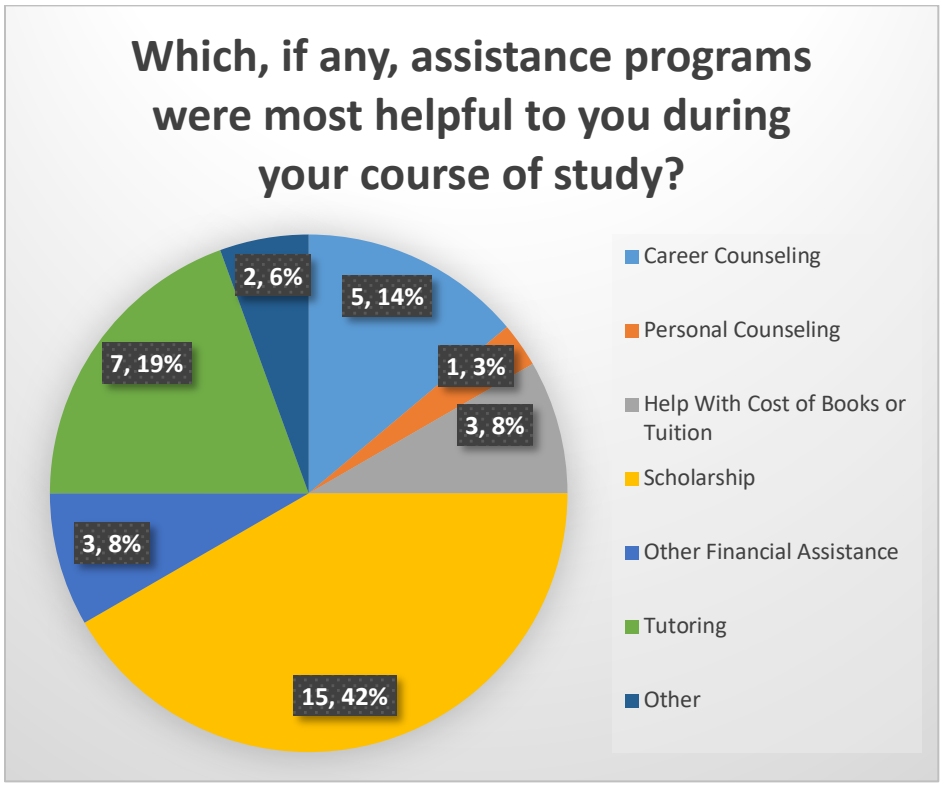
- Student feedback on the listed SLO's are above the program's Benchmark of "Students in the class should achieve a grade of 70% or higher"
- No needed action to be taken on SLO's feedback from students at this time.

2 Senior Exit Interview		
Focuses on individual and group feedback in support of student suggestions for improving the program.	Assessment findings are drawn from a group interview based on open ended questions for suggestions.	Yearly

Access to the Senior Exit Interview Survey can be obtained by clicking on this QR code:

Information Obtained:





Action Taken as a Result of the Collected Data:

The Senior Exit interview results supports a high level of student satisfaction as it relates to how well their learned knowledge aligns with their current job.

Survey Data further revealed the importance of scholarship support to students in the program; therefore, an emphasis will be placed to increase CM scholarship funding by working directly with the;

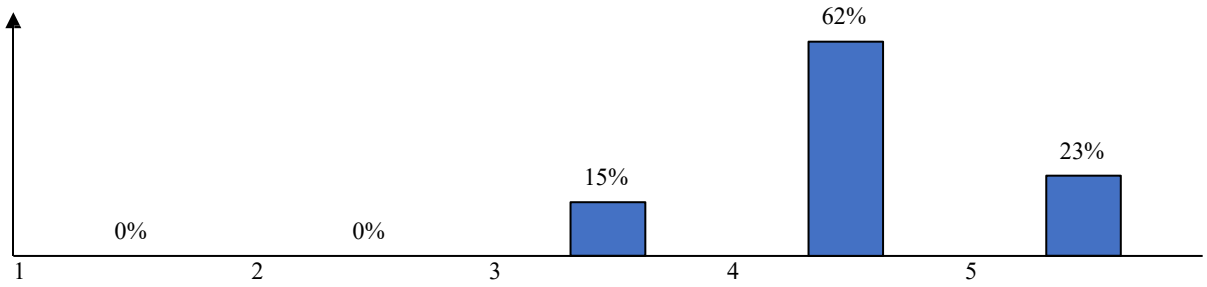
- University Foundation Office
- Companies Across the State of Wyoming, and
- To List State and National Grants (SEWBA, AGC, NAHB) on the CM program website.

3. Employer Survey (Internships)		
Focuses on Program Objectives as viewed from an employer's platform.	Assessment findings are based on a Likert Scale in support of program objectives.	Yearly

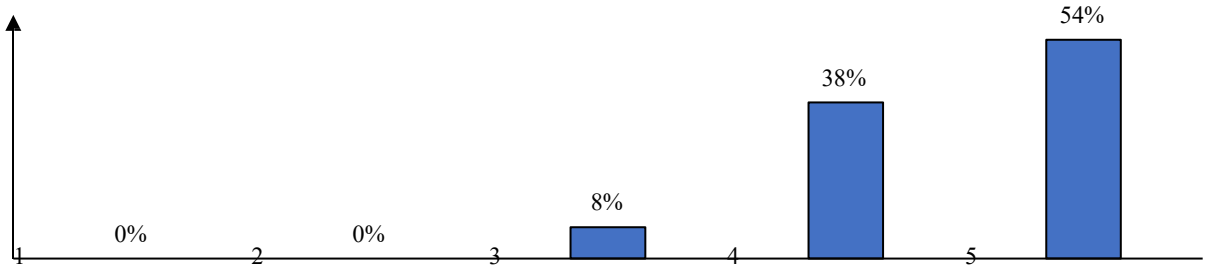
Access to the Employer Survey (Internship) can be obtained by clicking on this QR code:

Information Obtained:

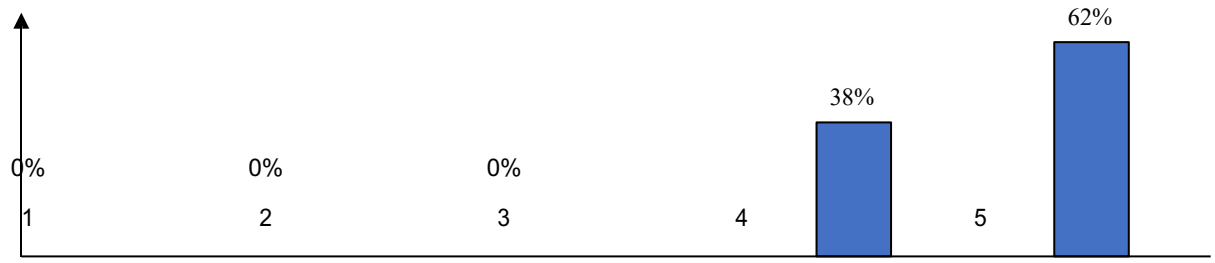
1. Student displayed effective writing skills appropriate to the construction discipline (SLO 1)



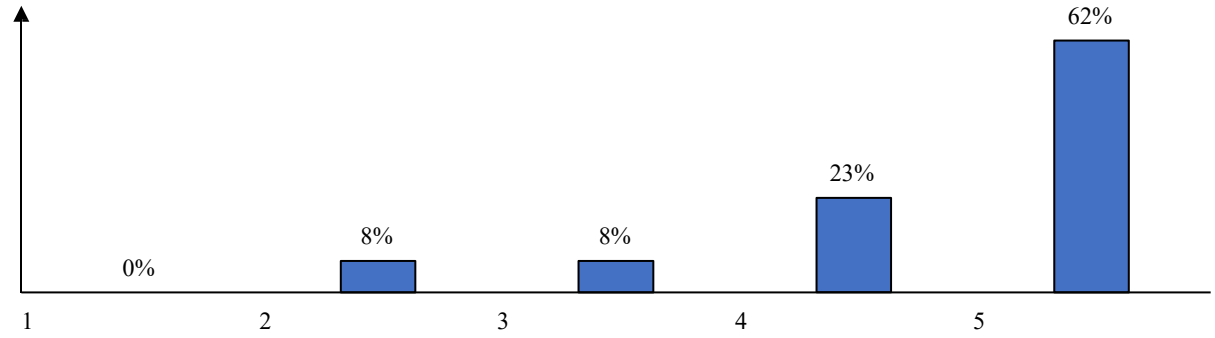
2. Student demonstrated effective oral communication skills appropriate to the construction discipline



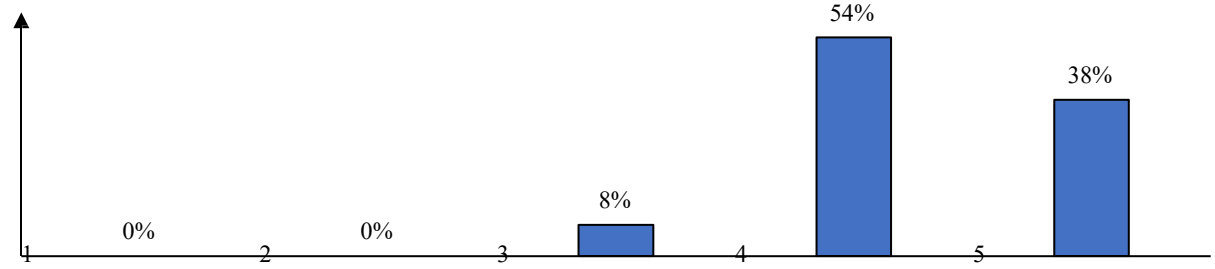
1. Student worked well within a multi-disciplinary team setting (SLO 9)



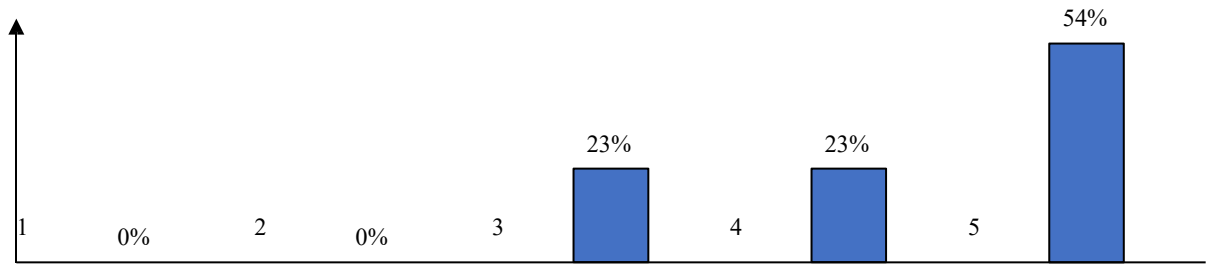
2. Student demonstrated effective problem solving skills



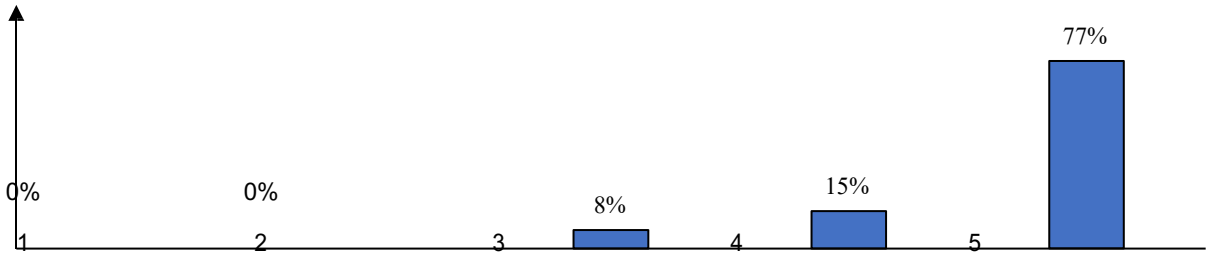
3. Student displayed effective understanding of construction terms and concepts (SLO 8)



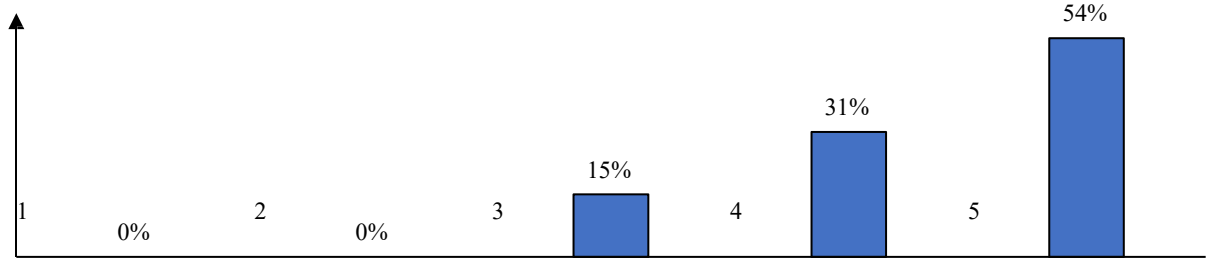
1. Student demonstrated the ability to complete tasks on time



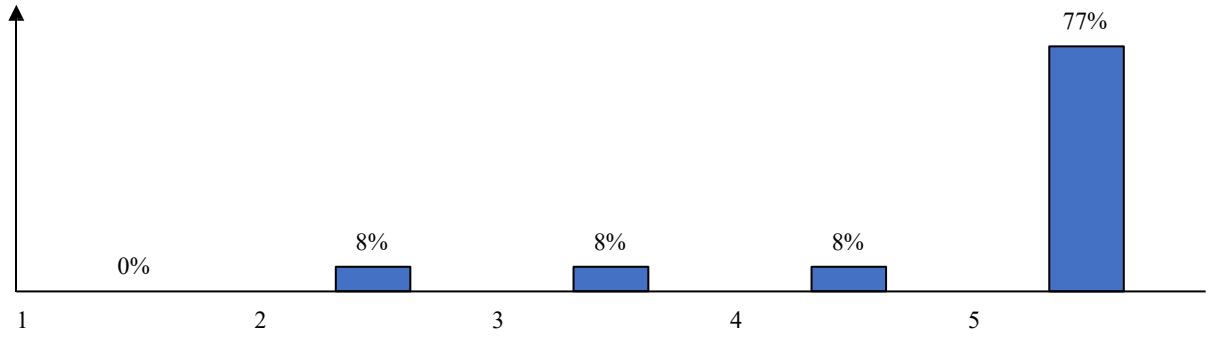
2. Student could apply electronic-based technology to manage the construction process (SLO 10)



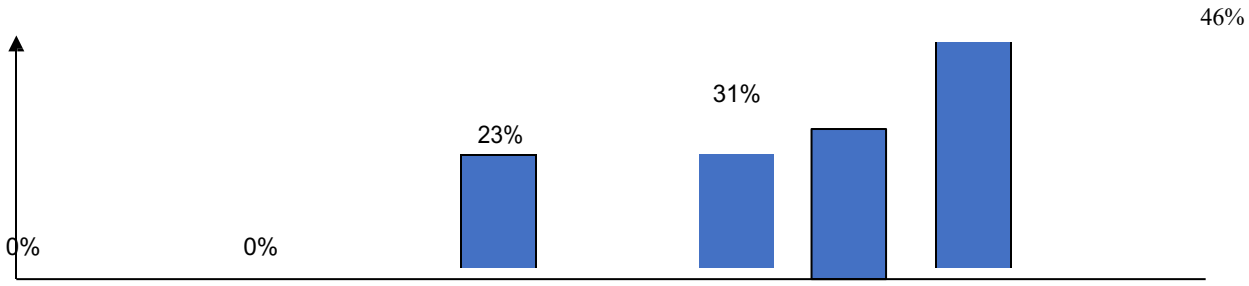
3. Student demonstrated the ability to acquire and process new information



1. Student demonstrated punctual behavior



2. Student demonstrated the ability to analyze construction documents



Action Taken as a Result of the Collected Data:

Internship comments from employers demonstrated positive feedback at large, with the exception of a lower indication (8%) feedback on;

- Punctual Behavior
- Problem Solving Skills

This feedback (8%) can be linked to a few students only; however, the program accepts this feedback as constructive and will compare and evaluate the "Problem Solving" feedback to the National AIC data once received in June 2022.

This comparison will then determine if a need exists for greater teaching in these areas.

4. Alumni Survey		
Survey will be administered to graduates two years after graduation. Will focus on how well they can apply what they learned in their profession.	Assessment survey will focus on the program objectives and how well students feel they were prepared for success in the field.	Yearly Spring 2024

Access to the Alumni Survey can be obtained by clicking on this QR code:

Information Obtained:

To be obtained in May 2025

Action Taken as a Result of the Collected Data:

- **To be determined in May 2025**

5 Pre/Post Course Evaluation		
Administered to students at the beginning of each course to determine their level of understanding before and after a course has been taught.	Assessment findings are based on the student learning outcomes for each class	Every Semester

Information Obtained:

The following Indirect Pre and Post Survey data, help guide instructors on student learning perception. Pre and Post Surveys are administered every semester, in every CM course taught.

- **Purple indicates a student's understanding on a specific SLO before the beginning of a semester.**
- **Green indicates a student's understanding on a specific SLO at the end of the semester.**
- **Graph Headings indicate in which course SLOs were measured.**

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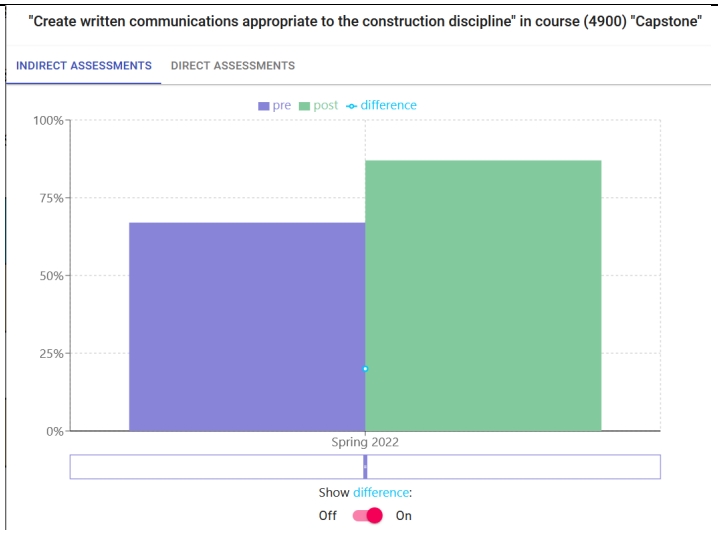
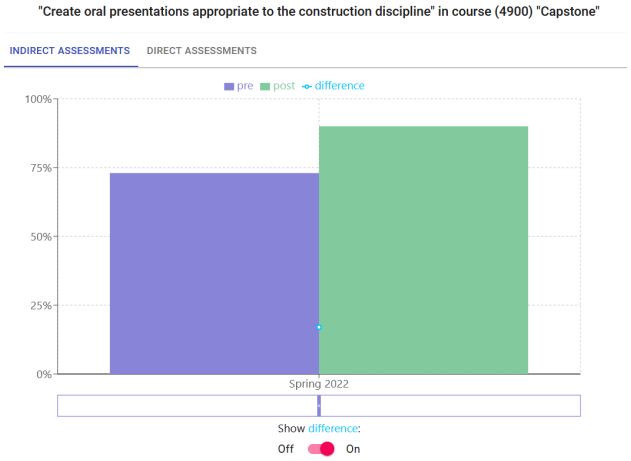
SLO 1	
SLO 2	
SLO 3	

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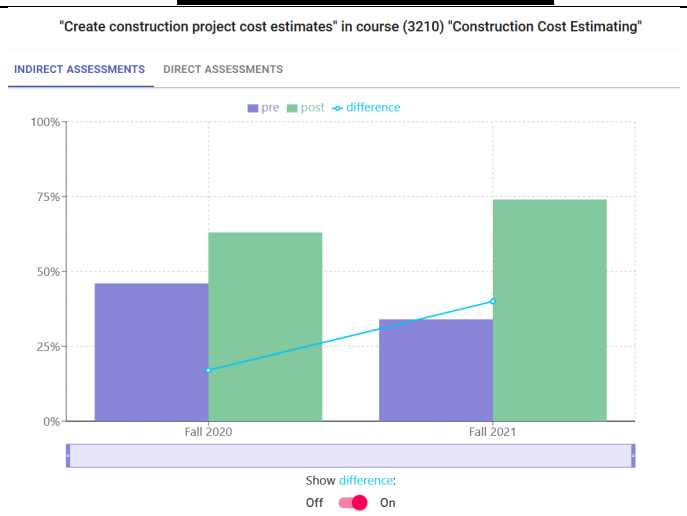
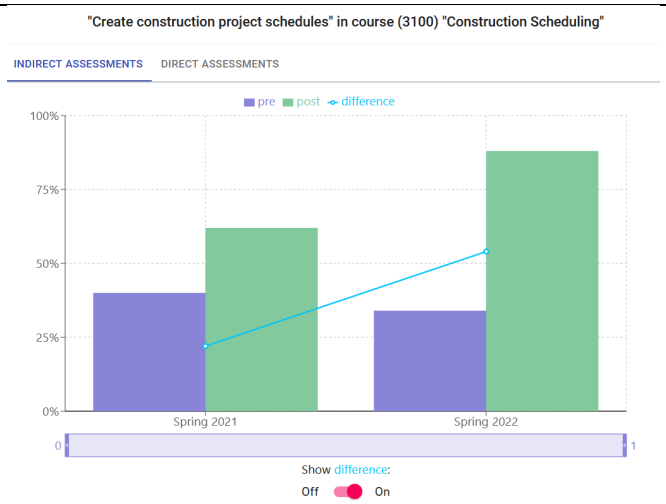
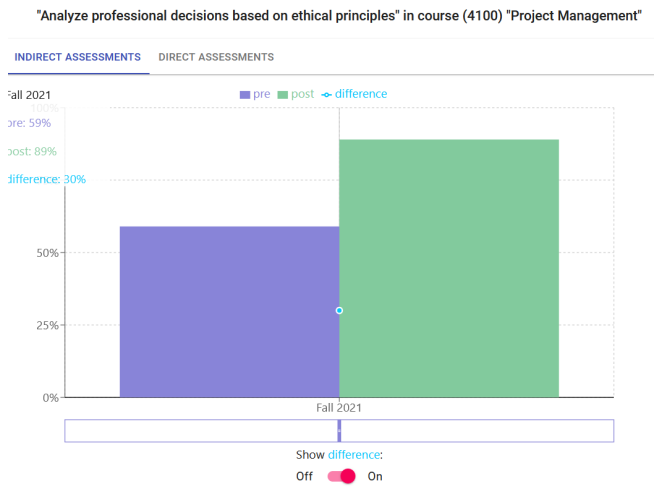
SLO 4	
SLO 5	
SLO 6	

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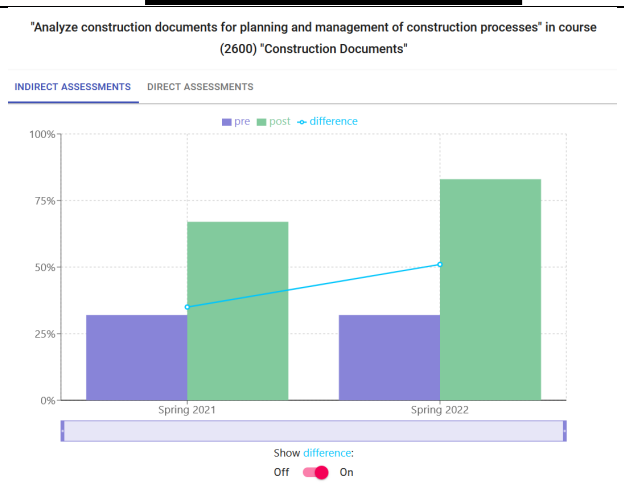
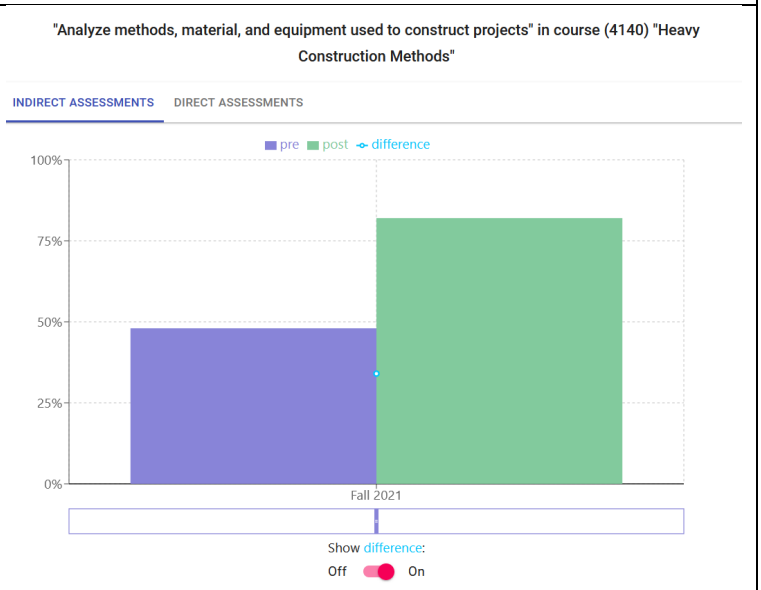
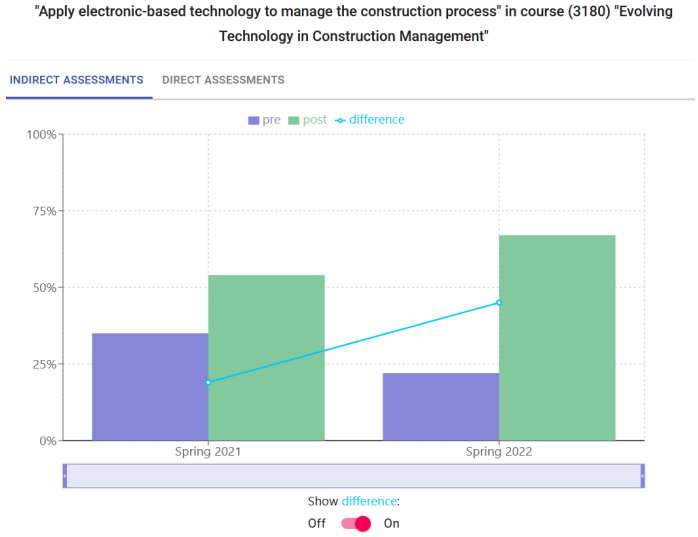
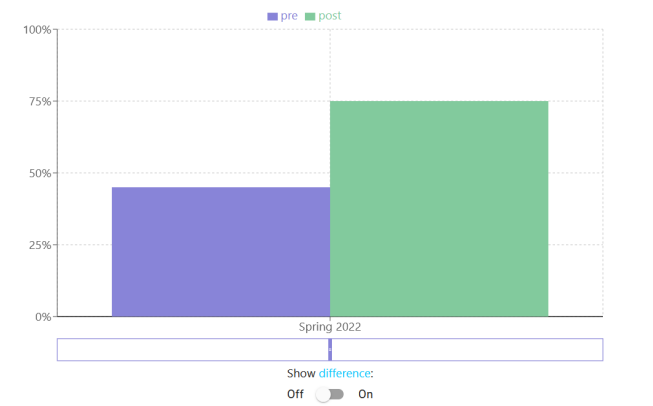
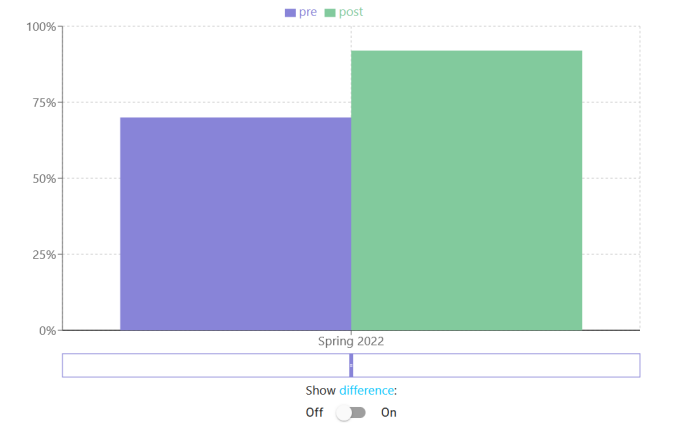
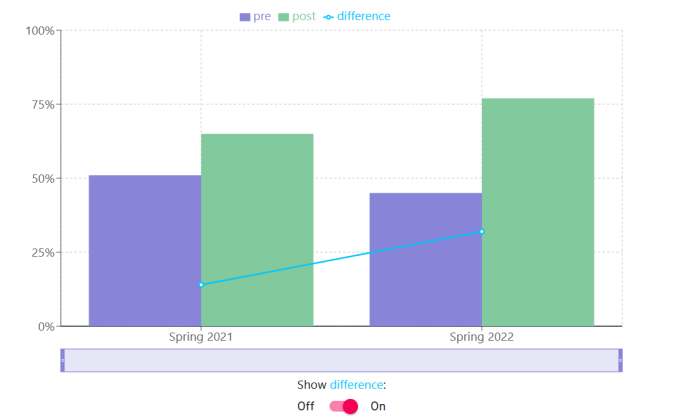
SLO 7	
SLO 8	
SLO 9	

SLO 10	"Apply basic surveying techniques for construction layout and control" in course (2070) "Engineering Surveying" INDIRECT ASSESSMENTS DIRECT ASSESSMENTS 
SLO 11	"Understand construction management skills as a member of a multi-disciplinary team" in course (4600) "Building Information Modeling (BIM)" INDIRECT ASSESSMENTS DIRECT ASSESSMENTS 
SLO 12	"Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process" in course (3160) "Construction Laws and Contracts" INDIRECT ASSESSMENTS DIRECT ASSESSMENTS 

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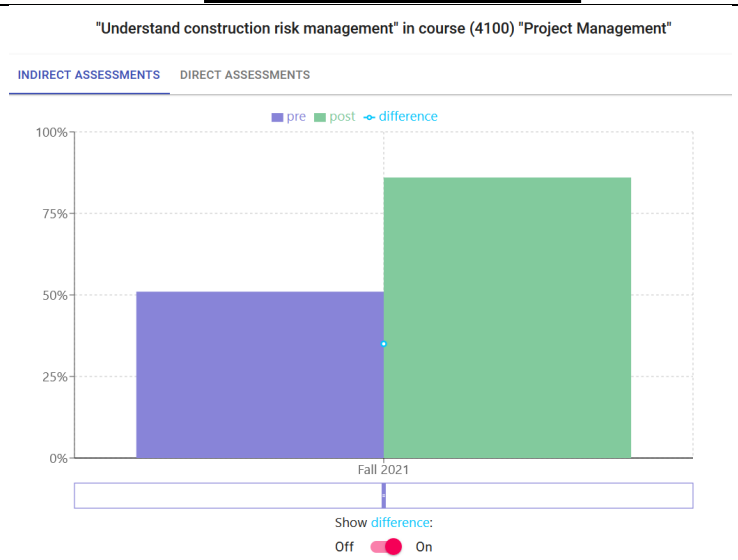
SLO 13	
SLO 14	
SLO 15	

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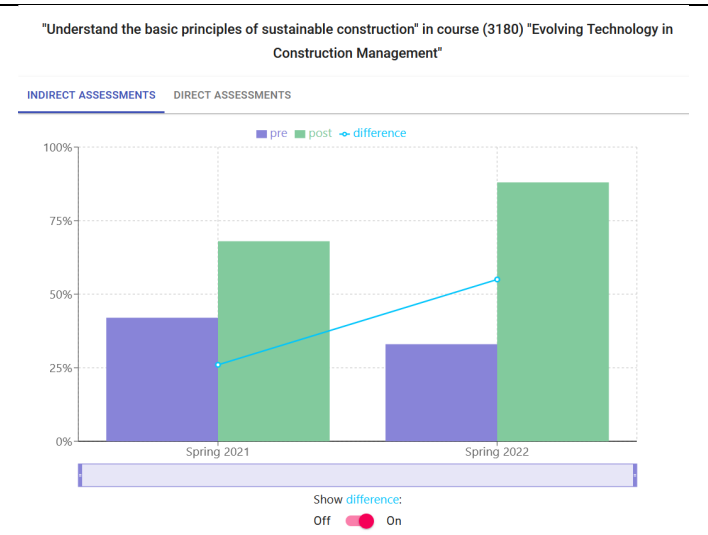
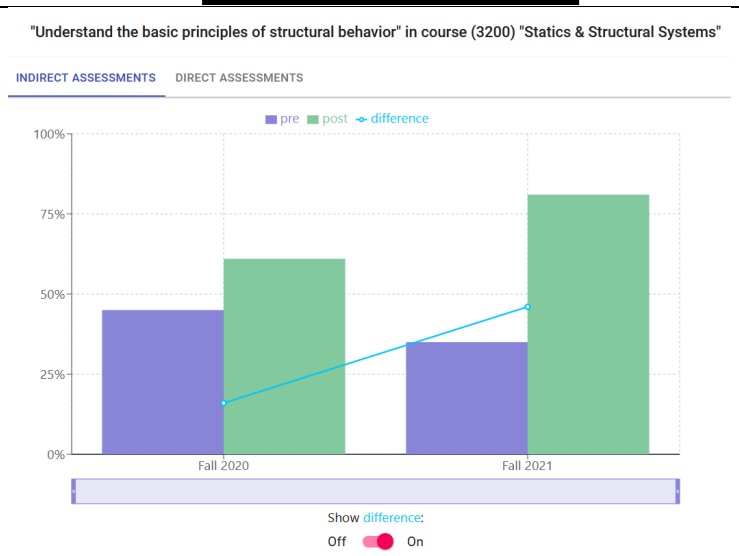
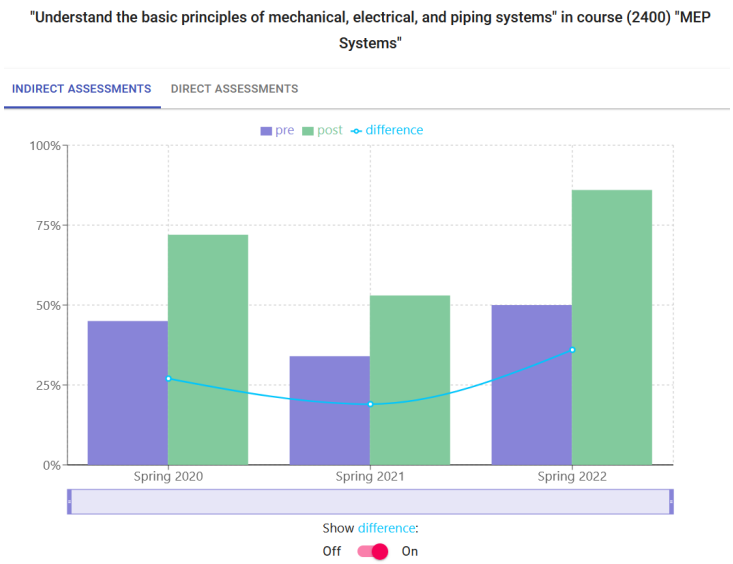
SLO 16	
SLO 17	
SLO 18	

SLO 19	
SLO 20	

Action Taken as a Result of the Collected Data:

Pre and Post survey data demonstrates a constant positive delta between what students know at the beginning of a semester and their knowledge interpretation/perception towards the end of the semester.

Pre-Survey data is shared with instructors during the second week of the semester in helping them understand what the knowledge base of students in their class is. No needed action to be taken.

6 Student Work		
Administered during every semester in the form of Assignments, Tests, Quizzes, Lab Reports, and Projects. Focuses on how well students comprehend course material.	Assessment findings are based on student work in all CM related courses	Every Semester

The CM program conducts assessment in every course that is offered each semester. A Programmable Matrix was created to support assessment on a semester continuum.

Matrix Video Link:

https://use.vg/xDsQog

The Course Benchmark in every CM course is:

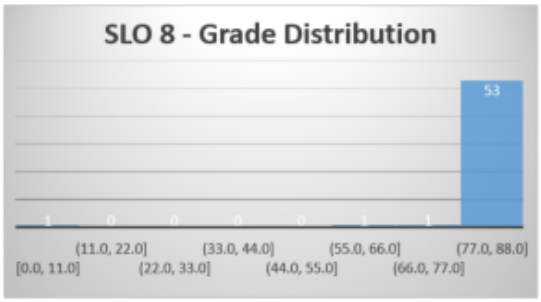
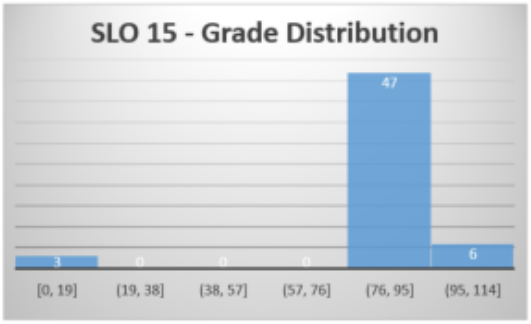
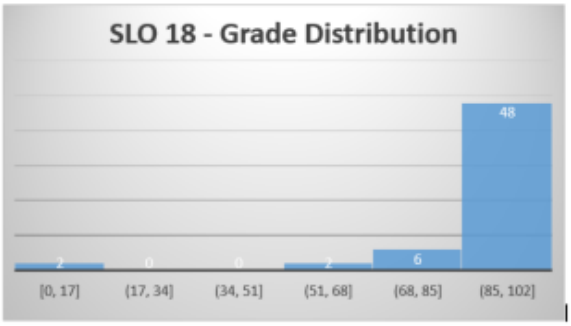
- **75% of students in the class should achieve a grade of 70% (C) or higher.**

This Benchmark in the form of Assignments, Tests, Quizzes, Lab Reports, and Projects, focuses on how well students comprehend the course material across CM classes where specific SLO's are measured.

Information Obtained:

The Following break demonstrates how many students were enrolled per class, the average class grade , and the specific SLO measured.

College of Engineering and Applied Science
Civil and Architectural Engineering and Construction Management

CM 2120 **Construction Materials and Methods**	**Students Enrolled in Class:** 56 **Average Grade in Class**: 84.8% **Average Grade on SLO (8 = 80.4%) (15 = 84.8) (18 = 87.2)** **75% of Students Received 70% and higher on SLO 8 as shown below**  **75% of Students Received 70% and higher on SLO 15 as shown below**  **75% of Students Received 70% and higher on SLO 18 as shown below** 

College of Engineering and Applied Science
Civil and Architectural Engineering and Construction Management

CE 2070

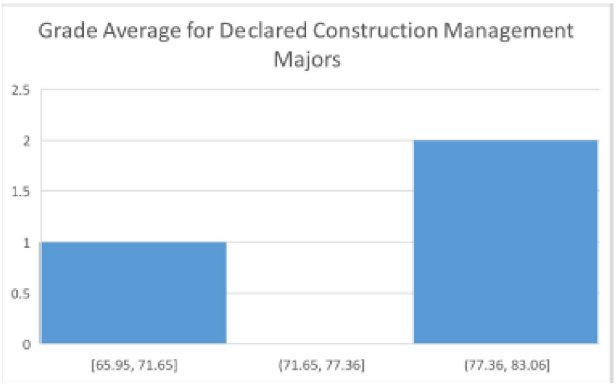
Engineering Surveying

Students Enrolled in Class: 46

Average Grade in Class: 87.4 %

Average Grade on SLO 10 for CM students only: 75.7%

75% of Students Received 70% and higher on SLO 10 as shown below



CM 2300

Construction Safety

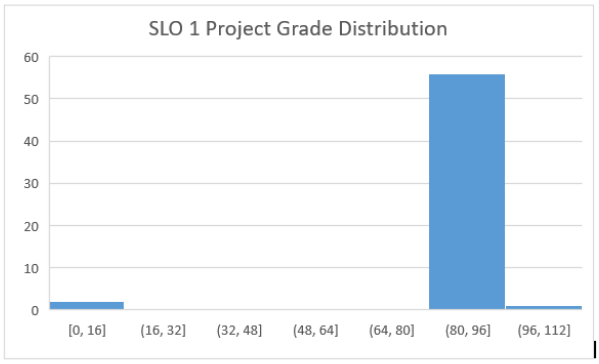
Students Enrolled in Class: 58

Average Grade in Class: 87.43

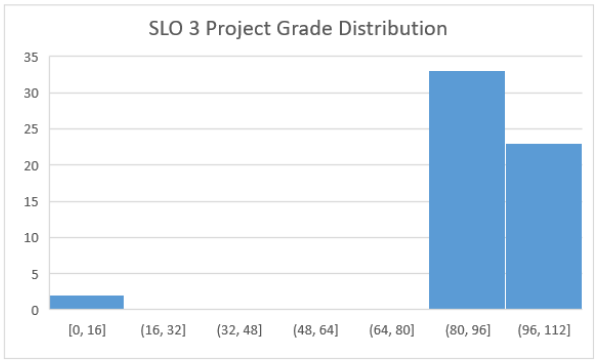
Average Grade on SLO 1: 95%

Average Grade on SLO 3: 89.3

75% of Students Received 70% and higher on SLO 1 as shown below



75% of Students Received 70% and higher on SLO 3 as shown below



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CM 2400

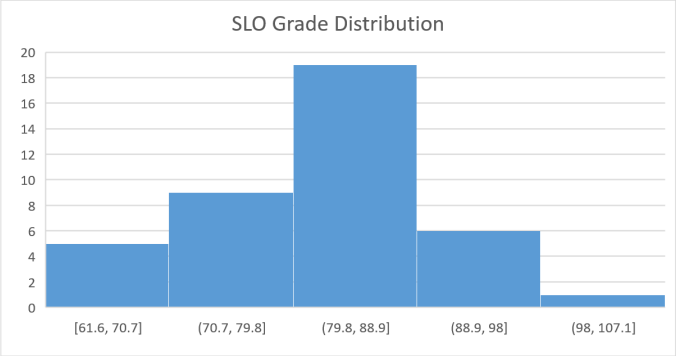
Mechanical Electrical and Plumbing

Students Enrolled in Class: 41

Average Grade in Class: 79.8

Average Grade on SLO 20: 81

More than 75% of Students Received 70% and higher on SLO 20 as shown below



CM 2600

Construction Documents

Students Enrolled in Class: 58

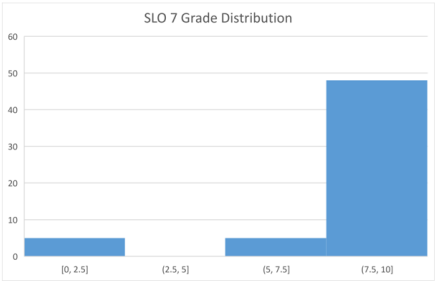
Average Grade in Class: 91.9%

Average Grade on SLO 7: 84.8%

Average Grade on SLO 10: 53.4%

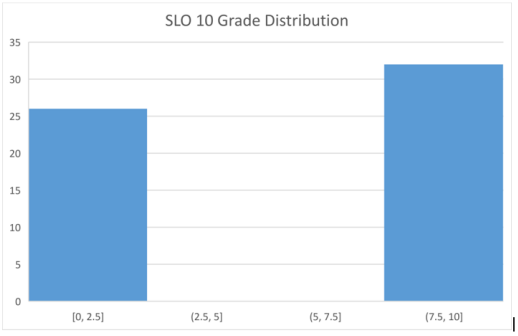
75% of Students Received 70% and higher on SLO 7 as shown below

Maximum Score 10 pts



NOT MEET: 75% of Students Received 70% and higher on SLO 10 as shown below

Maximum Score 10 pts



College of Engineering and Applied Science
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CM 3210

Construction Cost Estimating

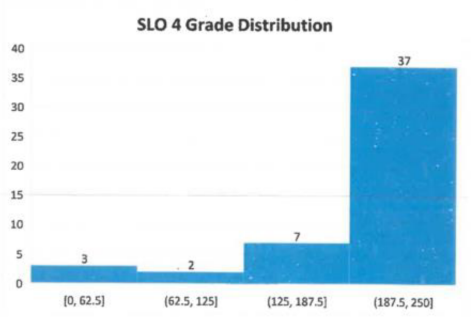
Students Enrolled in Class: 49

Average Grade in Class: 86.7 %

Average Grade on SLO 8: 78.9 %

75% of Students Received 70% and higher on SLO 4 as shown below

Maximum Score 250 pts



CM 3220

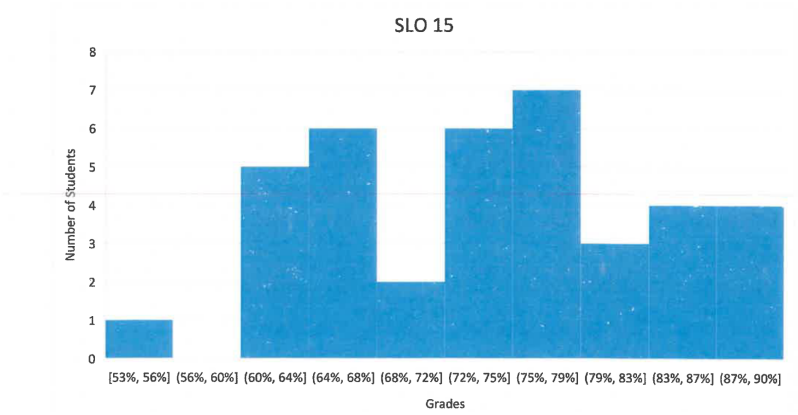
Soils & Concrete

Students Enrolled in Class: 39

Average Grade in Class: 80.5%

Average Grade on SLO 15: 78%

71% of Students Received 70% and higher on SLO 15 as shown below



CM 3200

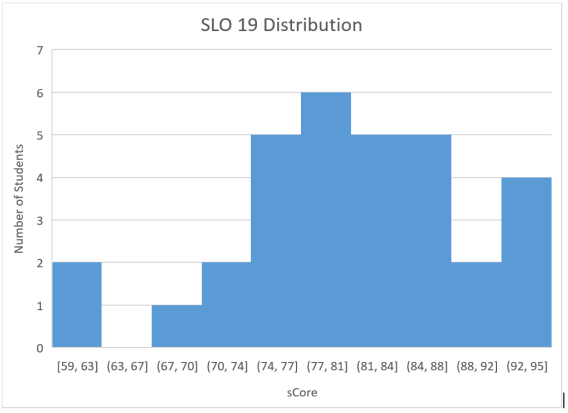
Statics & Structural Systems

Students Enrolled in Class: 32

Average Grade in Class: 84.2%

Average Grade on SLO 19: 80.33% **(Changed course from a 3 to a 4 credit course in support of program improvement)**

75% of Students Received 70% and higher on SLO 8 as shown below



College of Engineering and Applied Science
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CM 3100

Construction Scheduling

Students Enrolled in Class: 34

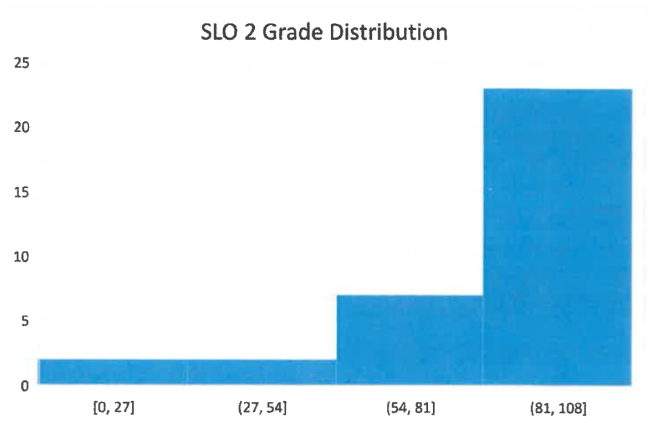
Average Grade in Class: 83.8%

Average Grade on SLO 2: 81%

Average Grade on SLO 5: 91%

75% of Students Received 70% and higher on SLO 2 as shown below

Maximum Score 50 pts



College of Engineering and Applied Science
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CM 3160

Law & Contracts

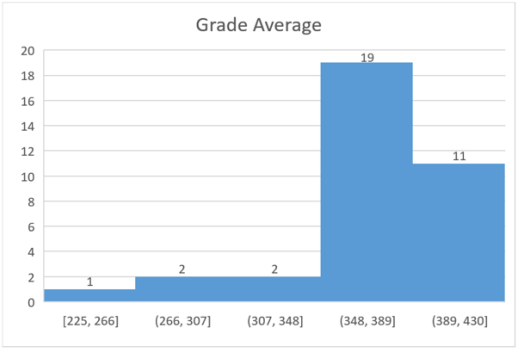
Students Enrolled in Class: 36

Average Grade in Class: 92%

Average Grade on SLO 12: 92%

75% of Students Received 70% and higher on SLO 12 as shown below

SLO 12 project counted out of 430



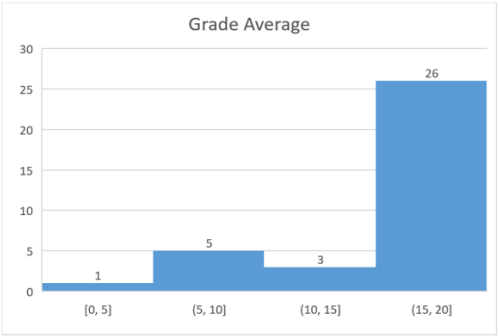
Students Enrolled in Class: 36

Average Grade in Class: 72%

Average Grade on SLO 17: 72%

75% of Students Received 70% and higher on SLO 17 as shown below

SLO 17 project counted out of 20



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CM 3180

Evolving Technologies in CM

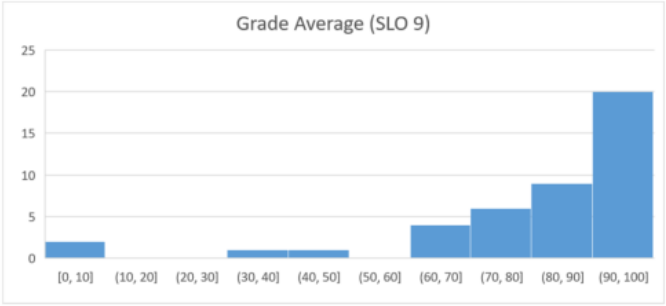
Students Enrolled in Class: 43

Average Grade in Class: 83.7%

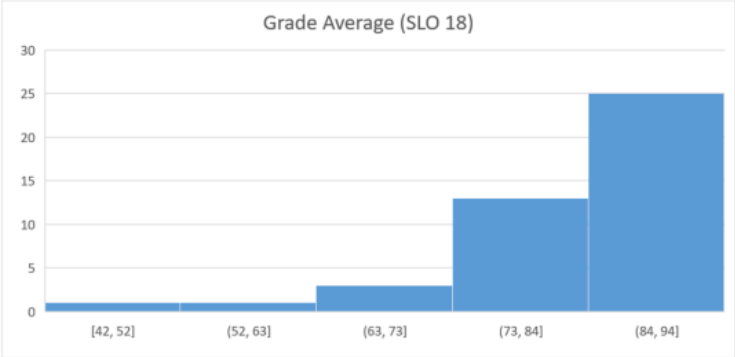
Average Grade on SLO 9: 81.5%

Average Grade on SLO 18: 83%

75% of Students Received 70% and higher on SLO 9 as shown below



75% of Students Received 70% and higher on SLO 18 as shown below



CM 4100

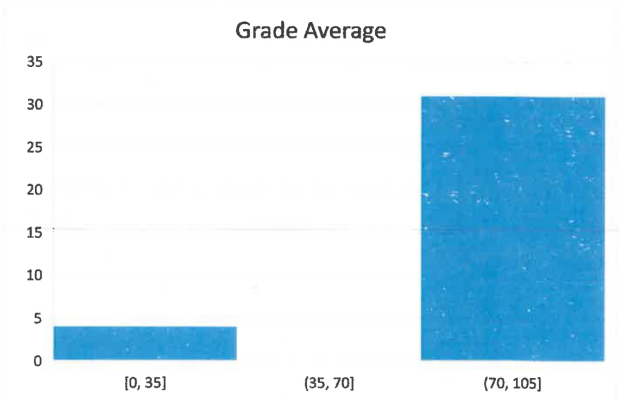
Project Management

Students Enrolled in Class: 35

Average Grade in Class: 94.7%

Average Grade on SLO 6: 89

92% of Students Received 70% and higher on SLO 6 as shown below



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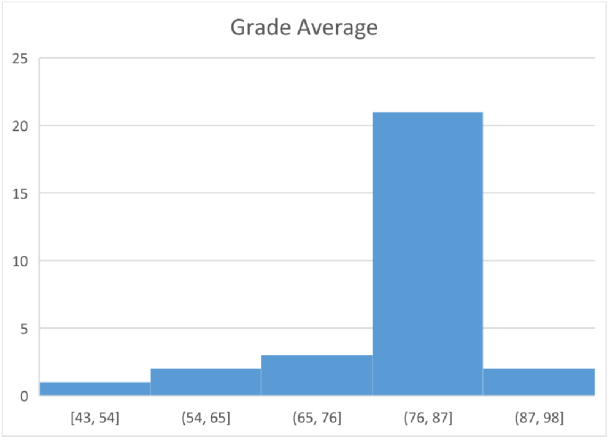
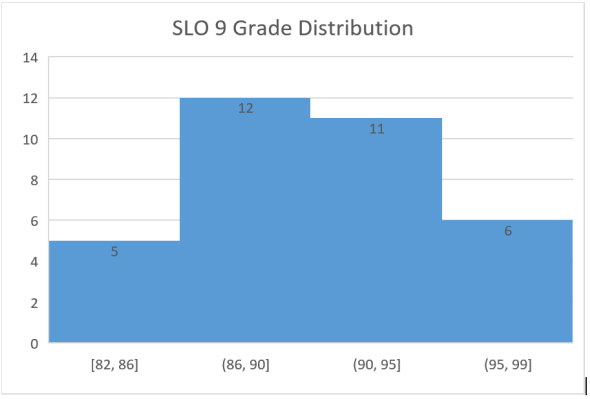
CM 4140 **Heavy Construction Methods**	**Students Enrolled in Class:** 29 **Average Grade in Class**: 81.44 % **Average Grade on SLO 8:** 78 % **75% of Students Received 70% and higher on SLO 8 as shown below** 
CM 4600 **Building Information Modeling**	**Students Enrolled in Class:** 34 **Average Grade in Class**: 89% **Average Grade on SLO 9 (2 projects):** 90.5 **Benchmark met: All students scored 70% and higher on SLO 9 as shown below** 

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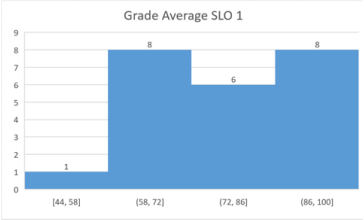
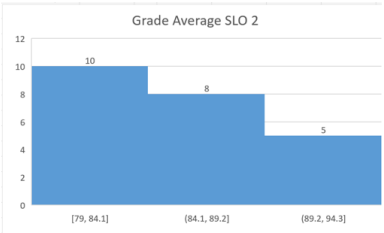
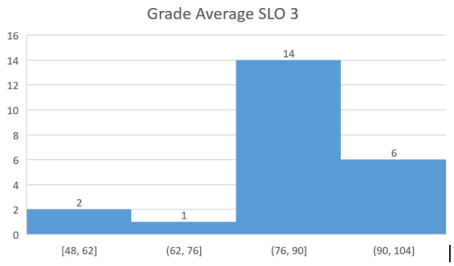
CM 4900 **Capstone**	**Average Grade in Class: 83.4 %** **Average Grade on SLO 1: 77 %** **Average Grade on SLO 2: 86%** **Average Grade on SLO 3: 84 %** **75% of Students Received 70% and higher on SLO 1 as shown below**  **75% of Students Received 70% and higher on SLO 2 as shown below**  **75% of Students Received 70% and higher on SLO 3 as shown below** 

Action Taken as a Result of the Collected Data:

The following actions have been taken and implemented as a result of accurate tracking of student performance in every CM class. Tracking of student performance in every class is to ensure that the course and program Benchmark is met :

- **75% of students in the class should achieve a grade of 70% (C) or higher.**

Action 1.

The benchmark for SLO 10 in CM 2600 (Construction Documents) were not met. The instructor notated that as such to ensure more time will be given on the final exam for students to perform better on this specific SLO.

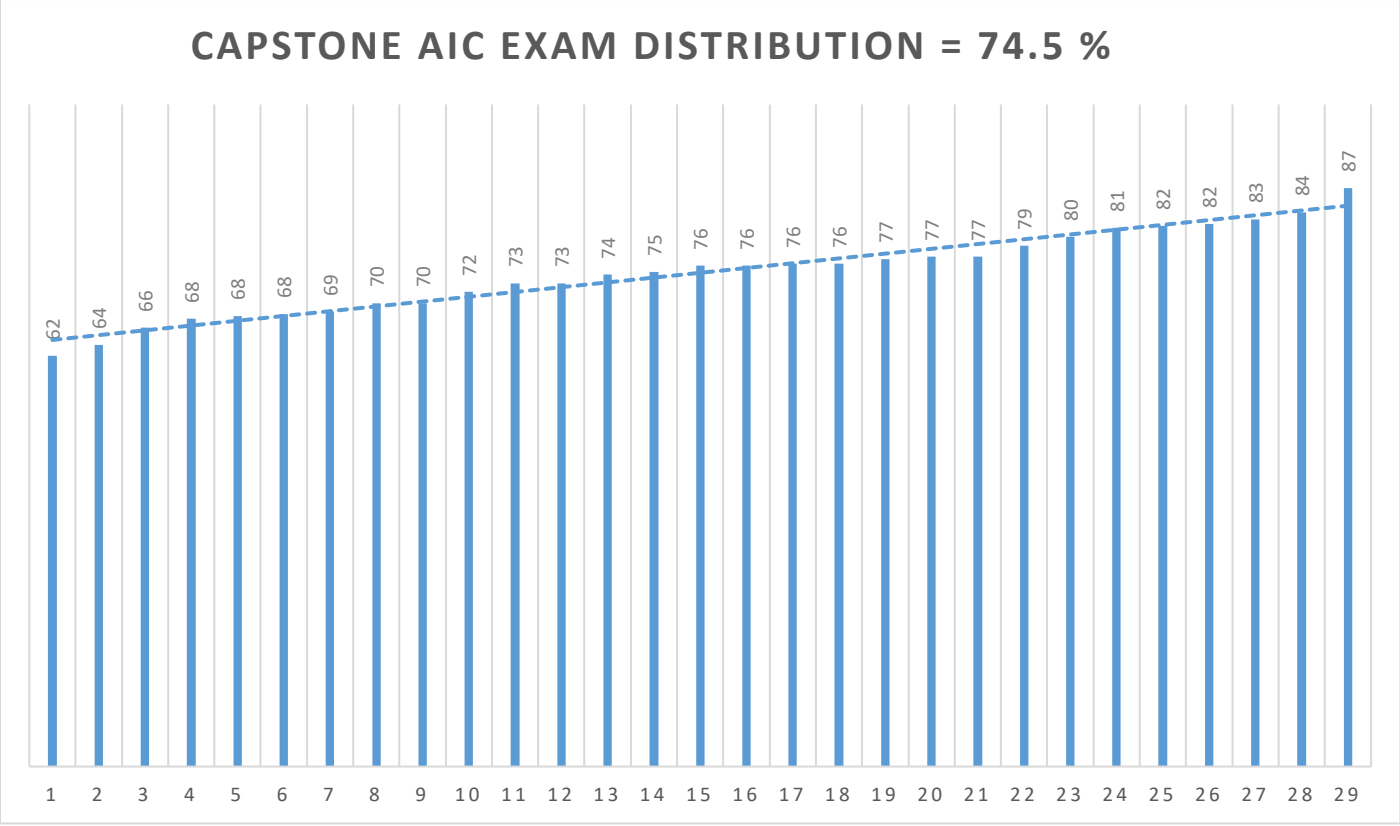
Action 2.

The benchmark for SLO 19 was met; however, the instructor felt that not enough teaching time was available to the instructor based on the level of where students were in his class. This request prompted to change the course from a 3 credit to a 4 credit course in the Fall of 2021, which has also been indicated in the catalog.

7 National AIC Exam		
The National AIC exam is a requirement for all senior students to take that focuses on ACCE SLO competencies.	Assessment findings are based on the AIC exam, required for all senior students.	Yearly

The National AIC Exam is a mandatory Capstone requirement that counts for 40% towards the capstone grade. The distribution table below represents the grade scale of the 29 students who took the exam in the spring of 2022.

Information Obtained:



Action Taken as a Result of the Collected Data:

The AIC average of students in the program was 74.5%, above that of the national average. The AIC exam is an embed element of the capstone course, where 40% of the capstone grade is linked to a student's AIC exam grade. Spring 2022 was the first time students in the program took the AIC exam. A recommended action is to help students prepare for the exam by providing in class AIC study sessions during the first few weeks of the capstone course. Also, to link AIC categories to specific CM courses to ensure instructors across the program will integrate AIC content as part of their course learning platform.

8 Professional Certificates		
Multiple integrated industry certificates are required by all CM students	Assessment is based on the acquiring of these certificates	Yearly

The following professional certificates are integrated across the following 5 CM courses. These certificates are connected to a student's grade in these courses. Not passing a certificate will not necessary fail a student, however, it will affect his/her grade points standing. The program enjoys a 95% and higher passing rate on these professional certificates.

Information Obtained:

CM 2600	PROCORE™ CLOUD-BASED CONSTRUCTION SOFTWARE
CM 2300	OSHA 30 HOUR CONSTRUCTION INDUSTRY TRAINING & CERTIFICATION
CM 3180	U.S. GREEN BUILDING COUNCIL LEED USGBC — LEED LEARDERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

CM 3140 (Elective)	
CM 4900	

Action Taken as a Result of the Collected Data:

Positive feedback has been received from industry on the value of these certificates. The program anticipates to add/integrate an additional certificate (DBIA) to the list during the 2022/23 academic year, as two professors in the program are qualified to teach and administer the DBIA certificate.

9 Teaching with Industry (TWI)		
Industry Practitioners are part of every CM course offered in the program.	Course input from practitioners is integrated by instructors of record every time a course is taught.	Every Semester

Teaching with Industry (TWI), is a teaching methodology adopted across all courses in the CM program, where an instructor of record list a minimum of two industry practitioners on the syllabus as co-instructors, with the intent to bridge the gap between information acquired in the classroom and the skills and competencies required in the industry. Below is an example of a syllabus cover page in support of TWI integration across 15 CM courses.

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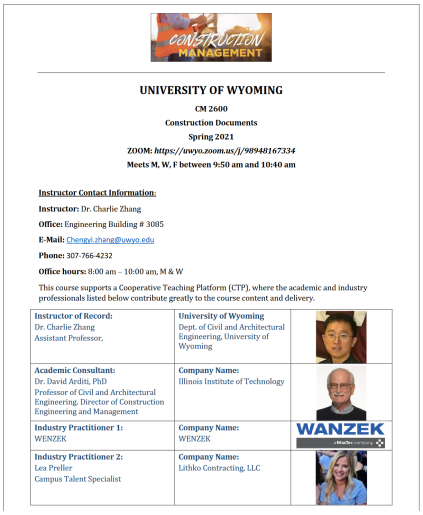


UNIVERSITY OF WYOMING

CM 2600

Construction Documents

Spring 2021

ZOOM: *https://uwyo.zoom.us/j/98948167334*

Meets M, W, F between 9:50 am and 10:40 am

Instructor Contact Information:

Instructor: Dr. Charlie Zhang

Office: Engineering Building # 3085

E-Mail: Chengyi.zhang@uwyo.edu

Phone: 307-766-4232

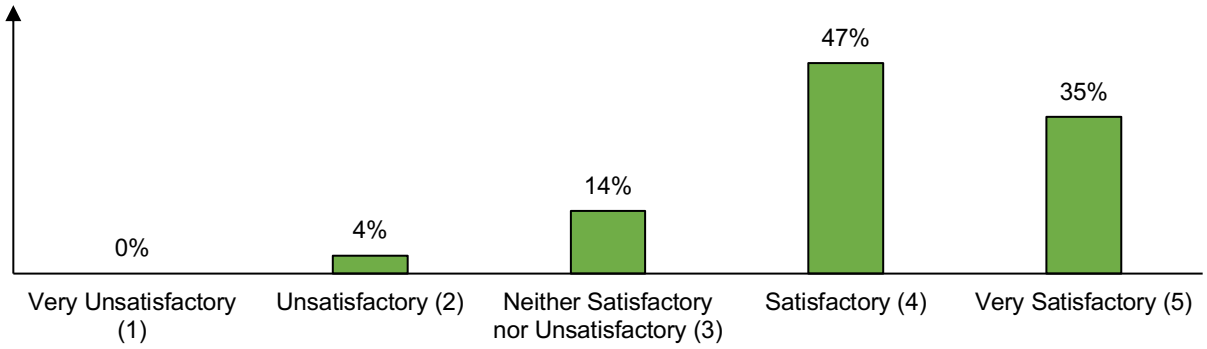
Office hours: 8:00 am – 10:00 am, M & W

This course supports a Cooperative Teaching Platform (CTP), where the academic and industry professionals listed below contribute greatly to the course content and delivery.

Instructor of Record: Dr. Charlie Zhang, Assistant Professor,	**University of Wyoming** Dept. of Civil and Architectural Engineering, University of Wyoming	
Academic Consultant: Dr. David Arditi, PhD, Professor of Civil and Architectural Engineering, Director of Construction Engineering and Management	**Company Name:** Illinois Institute of Technology	
Industry Practitioner 1: WENZEK	**Company Name:** WENZEK	
Industry Practitioner 2: Lea Preller, Campus Talent Specialist	**Company Name:** Lithko Contracting, LLC	

Information Obtained:

The program administers a TWI survey once a year in CM 2300, a mandatory course that all students have to take in support of TWI practitioner feedback. Below are the results on the student's impression about the relevance of practitioners as co-instructors in the program.



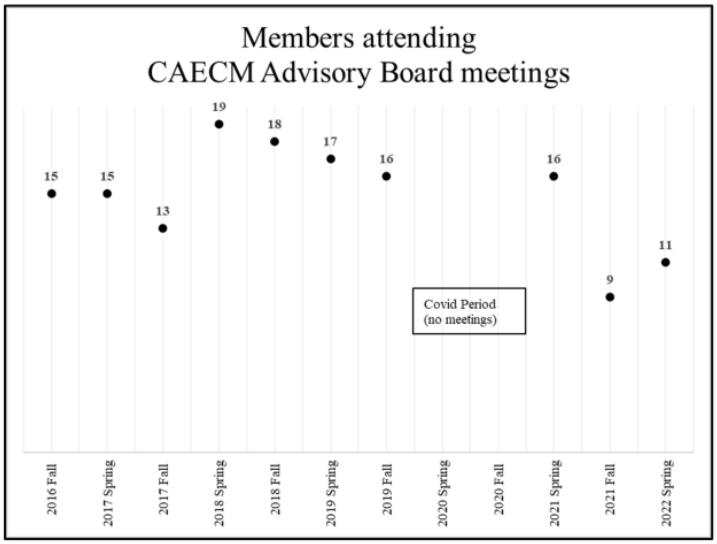
Action Taken as a Result of the Collected Data:

The program anticipates to continue to expand the TWI platform with the help and support of the Wyoming AGC, through financial support from the AGC to CM instructors who commit to aligned TWI co-teaching with industry practitioners, as early as the fall of 2022.

10 Industry Advisory Board		
IAB Board members engage in the strategic mission and vision of the program.	The IAB meets twice a year with direct feedback on trends in the industry as it relates to student learning outcomes.	Twice Yearly

Information Obtained:

The Departmental Advisory Board has been very active in supporting the Construction Management program since efforts to create the program began in 2016. The Advisory Board generally consists of 15 members from the professions of Civil Engineering, Architectural Engineering, and Construction Management. It is self-governing in terms of membership, with four-year terms of service. The Advisory Board has a two-day meeting on campus each semester (2x/year).



Action Taken as a Result of the Collected Data:

Here are some key contributions of the Advisory Board with regard to the Construction Management program since its inception:

2016: Several Advisory Board members wrote letters of support for the Program Proposal

2017: One Advisory Board member gave substantial financial gift

2017-18: All Advisory Board members participated in:

- Identifying peer CM programs and studying their curricula. 8 peer programs were identified and an analysis of common coursework was conducted (see image below).
- Identifying areas of distinction for UW CM program
- Reviewing drafts of CM Curriculum

2018:	Several Advisory Board members lobbied directly with UW Administrators and Trustees for approval of the CM Program
2019-22:	Several Advisory Board members participated in recruiting process for CM faculty hires
2020:	(Advisory Board did not meet due to Covid)
2020:	(by email) All Advisory Board members endorsed Department name change, from 'Civil & Architectural Engineering' to 'Civil and Architectural Engineering and Construction Management'.
2021:	All Advisory Board members reviewed CM Curriculum changes
2021-22:	One Advisory Board member participated heavily in ACCE accreditation visit Some other Advisory Board members participated lightly in ACCE accreditation visit