NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 1

Create written communications appropriate to the construction discipline

Create Written Communications

Assessment of SLO # **1** **Create written communications appropriate to the construction discipline**

NAU Interpretation *Written communications appropriate to the construction discipline include agendas, daily field reports, RFIs, letters of intent and general business letters. At the 'Create' level, students will produce such documents.*

Direct Assessment

Course **CM302W** **Prof. Writing** ***Course Learning Outcome:*** Organize, compose, and edit written business correspondence used to plan and manage the construction process, such as emails, memorandums, business letters, daily logs, meeting minutes, and proposals to customers.

Assessment: 47 Write business letter to owner - midterm exam essay — Semester Assessed S22 *Score** **92%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Create written communications appropriate to the construction discipline.

Assessment: 319 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Create written communications appropriate to the construction discipline. — Semester Assessed S22 *Score** **94%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students Demonstrate proficiency with writing skills and report a correspondingly high confidence in their abilities. Confidence and performance have improved over time, with consistent scores above 85%. We attribute this to the extra effort that we have put into assisting students with writing skills outside of the classroom. This was done based on feedback from industry, especially as it relates to writing emails and letters.

Corrective Actions Taken

2018 - Incorporated NAU Career Development resources into writing course (302W)
2021 - Began tracking student performance in writing in Capstone (CM490c) course

Next Steps

We will continue to provide students with opportunities for supplemental writing assistance, including promotion of the use of the NAU Writing Commons.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 2

Create oral presentations appropriate to the construction discipline

Create Oral Communications

Assessment of SLO # **2** **Create oral presentations appropriate to the construction discipline**

NAU Interpretation *Creating oral presentations requires organizing and preparing verbal statements, developing supporting materials (handouts, slide decks) and delivering the presentation to an audience. Delivery includes both live and video formats. Types of oral presentations that are appropriate to the construction discipline include persuasive presentations of qualifications and proposals, informative talks (e.g. training seminars), and professional discourse (e.g. elevator speech).*

Direct Assessment

Course **CM489** **Proj. Admin.** ***Course Learning Outcome:*** Understand the role of a project manager on a jobsite and demonstrate the management skills necessary to effectively run a project including oral presentations

Assessment: 172 peer review video assignment Semester Assessed S22 *Score** **100%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Create oral presentations appropriate to the construction discipline.

Assessment: 320 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Create oral presentations appropriate to the construction discipline. Semester Assessed S22 *Score** **90%** Competent

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 2

Create oral presentations appropriate to the construction discipline

Create Oral Communications

Assessment of SLO # **2** **Create oral presentations appropriate to the construction discipline**

NAU Interpretation *Creating oral presentations requires organizing and preparing verbal statements, developing supporting materials (handouts, slide decks) and delivering the presentation to an audience. Delivery includes both live and video formats. Types of oral presentations that are appropriate to the construction discipline include persuasive presentations of qualifications and proposals, informative talks (e.g. training seminars), and professional discourse (e.g. elevator speech).*

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Evaluation

CM Students are given many opportunities to give oral presentations throughout the course of their CM career. While many of these presentations are part of group projects, students are scored on an individual basis. The high performance on these assessments and students' self-reported confidence in creating oral presentations reflects this experience. We have found that students who participate in the ASC student competitions (and take electives CM205 and CM405) tend to excel in this area.

Corrective Actions Taken

2021 - Began development of holistic oral presentation rubric

Next Steps

Moving forward, we are working to develop a universal oral presentation rubric that can be used across the curriculum, based on the one used in CM489 and CM490c. We will continue to encourage students to participate in the ASC student competition.

Assessment of SLO # 3

Create a construction project safety plan.

Create a Safety Plan

Assessment of SLO # **3** **Create a construction project safety plan.**

NAU Interpretation *A safety plan is a written document that describes the process for identifying the physical and health hazards that could harm workers, procedures to prevent accidents, and steps to take when accidents occur. Creating a safety plan entails developing general safety policies at the organization level, site-specific plans at the project level and job hazard analyses at the task level. A project safety plan requires extensive understanding of construction materials, means and methods, as well as principles and standards for safety.*

Direct Assessment

Course **CM391** **Safety** ***Course Learning Outcome:*** Create a construction project safety plan

Assessment: 173 Project safety plan Semester Assessed S22 *Score** **87%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Create a construction Project Safety Plan

Assessment: 321 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Create a construction project safety plan. Semester Assessed S22 *Score** **90%** Competent

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Evaluation

Student performance on creating safety plans is strong. They get the opportunity to perform job hazard analyses in our integrated lab (CM200L) and a trade-specific plan in Steel Buildings (CM331). We also track students who earn OSHA 30 cards in Safety (CM391), and have a strong success rate, with the exception of the disruption from the pandemic which didn't allow some students to meet the in-person attendance requirement. We have noted that only one faculty member is certified by OSHA as a trainer.

Corrective Actions Taken

Next Steps

We will continue to include the OSHA training as part of CM391 and will look to add additional OSHA trainer credentials to our faculty.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 4

Create construction project cost estimates.

Create a Cost Estimate

Assessment of SLO # **4** **Create construction project cost estimates.**

NAU Interpretation *A construction project cost estimate is a comprehensive evaluation of project cost, broken down by scope of work, that includes labor, equipment and materials as well as overhead and profit margins. To create a cost estimate, students will perform a material take-off and apply unit costs to the resulting quantities. Included in this outcome are the scaffolding skills of performing material quantity take-offs from plans and specifications using both manual (paper) and digital methods, differentiating scopes of work, and determining unit costs.*

Direct Assessment

Course **CM329** **Estimating** ***Course Learning Outcome:*** Develop estimates for typical construction management functions including general conditions, general overhead, insurance, and profit

Assessment: 122 Final Project Semester Assessed S22 *Score** **83%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Create construction project cost estimates.

Assessment: 322 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Create construction project cost estimates. Semester Assessed S22 *Score** **90%** Competent

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Evaluation

Borderline competent performance in CM329 (Estimating Class) led us to begin tracking student performance in CM490c (Capstone) in Fall of 2021. The assessment in Estimating Class is challenging and complex, so the 83% result is not surprising. Results show improvement between Estimating and Capstone and students report high confidence in their competence in the senior survey. We have noticed that students who have completed internships tend to excel in their ability to create construction cost estimates.

Corrective Actions Taken

2021 - Developed individual assessment in Capstone (CM490c) to supplement direct assessment in Scheduling (CM329)

Next Steps

With the addition of CM260 (Infrastructure Methods) and CM426 (Advanced MEP) to the curriculum for students starting in 2021, we will be looking into developing cost estimating skills in CM329 (Estimating) in the areas of Site and MEP.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 5

Create construction project schedules.

Create a Schedule

Assessment of SLO # **5** **Create construction project schedules.**

NAU Interpretation *A construction project schedule includes activities, milestones and deliverables for a project, broken down by scope of work loaded with durations. To create a schedule, students identify and logically organize activities and determine durations based on quantity of work. These activities are linked via a network of dependencies which allow for determination of critical tasks and paths. Included in this outcome are the scaffolding skills of using scheduling software (e.g. Microsoft Project), determining activity durations from quantities and unit durations, and understanding other factors that affect construction schedules.*

Direct Assessment

Course **CM388** **Scheduling** ***Course Learning Outcome:*** Understand the logic and be able to prepare a detailed construction project schedule

Assessment: 143 Project schedule assignment Semester Assessed S22 *Score** **95%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Create construction project schedules.

Assessment: 323 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Create construction project schedules. Semester Assessed S22 *Score** **87%** Competent

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Evaluation

Students do consistently well on the Project Schedule assignment in the Scheduling class (CM388), with improving scores over the past 4 years. Since scheduling is such an essential skill in construction management, a second assessment in Capstone (CM490c) provides us with data on retention of knowledge from CM388. Students report confidence in their ability to create a construction project schedule, with increasing confidence over the past four years.

Corrective Actions Taken

2021 - Developed individual assessment in Capstone (CM490c) to track scheduling performance

Next Steps

As with our Estimating class, scheduling of infrastructure and MEP areas of construction need to be incorporated into CM388 in order to complement the new curriculum that includes CM260 and CM436.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 6

Analyze professional decisions based on ethical principles.

Analyze using Ethical Principles

Assessment of SLO # **6** **Analyze professional decisions based on ethical principles.**

NAU Interpretation *Ethical principles are ones in which pertain to right and wrong conduct, in accordance with the rules, norms and standards of the construction profession. To analyze professional decisions, students are expected to explore relationships among the components of a situation which lead to decision making.*

Direct Assessment

Course **CM481** **Operations** ***Course Learning Outcome:*** Develop critical leadership and decision making skills, based on ethical principles that will be necessary the management of a project and the people associated with the project

Assessment: 180 Ethics assignment relating Stanley Milgrim Experiment to Construction — Semester Assessed S22 *Score** **91%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Analyze professional decisions based on ethical principles.

Assessment: 324 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Analyze professional decisions based on ethical principles. — Semester Assessed S22 *Score** **95%** Competent

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Evaluation

Student performance on analyzing ethical decisions is consistently high, with a slight drop in 2022 upon introduction of new assessment tool. Students report high confidence in their ability to analyze professional decisions based on ethical principles, with an upward trend in their responses.

Corrective Actions Taken

2022 Changed assessment to assignment specifically aimed at ethics

Next Steps

No action planned

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 7

Analyze construction documents for planning and management of construction processes.

Analyze Const. Docs. to Manage

Assessment of SLO # **7** **Analyze construction documents for planning and management of construction processes.**

NAU Interpretation

Construction documents include contracts, plans and specifications that define the work to be done on a project. Analyzing construction documents for planning and management purposes means that students must go beyond understanding the content of those records. They must be able to examine and distinguish the interrelated content in order to determine scopes of work that are necessary to organize and manage a project. These skills are necessary for the higher level outcomes (e.g. creating a schedule, cost estimate and safety plans). Included in this outcome are the scaffolding tasks of plan and specification reading.

Direct Assessment

Course **CM331** **Steel Systems** ***Course Learning Outcome:*** Create a site logistics plan for steel construction

Assessment: 181 Logistics Plan - site and delivery component Semester Assessed F21 *Score** **77%** Satisfactory

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Analyze construction documents for planning and management of construction processes.

Assessment: 325 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Analyze construction documents for planning and management of construction processes. Semester Assessed S22 *Score** **91%** Competent

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 7

Analyze construction documents for planning and management of construction processes.

Analyze Const. Docs. to Manage

Assessment of SLO #	**7**	**Analyze construction documents for planning and management of construction processes.**
NAU Interpretation	*Construction documents include contracts, plans and specifications that define the work to be done on a project. Analyzing construction documents for planning and management purposes means that students must go beyond understanding the content of those records. They must be able to examine and distinguish the interrelated content in order to determine scopes of work that are necessary to organize and manage a project. These skills are necessary for the higher level outcomes (e.g. creating a schedule, cost estimate and safety plans). Included in this outcome are the scaffolding tasks of plan and specification reading.*	

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Evaluation

The original assessment of this outcome was administered in our CM200L as a group and was difficult to identify performance at an individual level. Students perform at a satisfactory level on the logistics plan in Steel Class (CM331). This is an individual assignment which students complete prior to working in a group to develop a full logistics plan for the final project. The quality of the work does improve on the final project, but since it is graded as a group it cannot be reported here.
Students do report confidence with this skill. Like with Written and Oral Presentation skills, we have found that students who elect to take CM205 and CM405 and compete in the Reno competition excel at site logistics planning due to the extra practice and coaching that is received.

Corrective Actions Taken

2019 Moved assessment from CM200L to Steel Systems (CM331) to better capture the complex nature of this outcome.

Next Steps

For future classes in CM331, consider bringing in the builder for the project to provide expert advice on how to approach the real site.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 8

Analyze methods, materials, and equipment used to construct projects.

Analyze Means and Methods

Assessment of SLO # **8** **Analyze methods, materials, and equipment used to construct projects.**

NAU Interpretation *Analyzing methods, materials and equipment used to construct projects means that students are able to differentiate among available options to complete construction tasks and select appropriate solutions. This outcome includes the scaffolding skills of understanding the basics of different construction materials including their properties and means and methods of construction.*

Direct Assessment

Course **CM331** **Steel Systems** ***Course Learning Outcome:*** select a crane for use in setting structural steel

Assessment: 183 Logistics Plan - crane selection and sequence component Semester Assessed F21 *Score** **84%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Analyze methods, materials, and equipment used to construct projects.

Assessment: 326 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Analyze methods, materials, and equipment used to construct projects. Semester Assessed S22 *Score** **92%** Competent

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Evaluation

Students demonstrate a competent level of proficiency in analyzing a project in order to select a crane and develop a sequence of construction for a steel frame. They consistently report a competent to exemplary level of confidence on this outcome.

Corrective Actions Taken

2022 Added Infrastructure (CM260) to the required curriculum

Next Steps

No action planned

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 9

Understand construction management skills as a member of a multi-disciplinary team.

Understand Team Skills

Assessment of SLO # **9** **Understand construction management skills as a member of a multi-disciplinary team.**

NAU Interpretation *The construction management profession requires an ability to work with others to complete a project. This includes coordination, communication and leadership skills. Applying these skills a s a member of a multi-disciplinary team involves working with others to collaboratively complete a project. Included in this outcome are the scaffolding skills of management and marketing.*

Direct Assessment

Course **CM400L** **C4P Lab 3** ***Course Learning Outcome:*** Coordinate, direct, and manage the activities of a construction team

Assessment: 149 Final Report - essay question on mangement Semester Assessed S22 *Score** **97%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Apply construction management skills as a member of a multi-disciplinary team.

Assessment: 327 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Apply construction management skills as a member of a multidisciplinary team. Semester Assessed S22 *Score** **95%** Exemplary

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Evaluation

The C4P course sequence (CM200L, CM300L, CM400L) provides a unique opportunity to apply team management skills as a member of a muli-disciplinary team. Students in the 400L class manage a real project that is designed by students in 300L and built by students in 200L. Earlier assessments via a final report in CM400L showed marginal performance. We attributed this partially to the nature of the assessment and subsequently modified the assessment to specifically have students comment on team management. Results in F21 and S22 demonstrate exemplary performance in this area

Corrective Actions Taken

2021 Modified final report in CM400L to more directly assess team management skills
2022 ACCE changed this SLO from Apply to Understand level

Next Steps

No action planned

Assessment of SLO # 10

Apply electronic-based technology to manage the construction process.

Apply Technology to Manage

Assessment of SLO # **10** **Apply electronic-based technology to manage the construction process.**

NAU Interpretation

Electronic-based technology used to manage the construction process includes software used for design (e.g. Revit), documentation (e.g. MS Word & PowerPoint) and productivity (e.g. MS Project, Excel, On Screen Takeoff, Bluebeam). Other software (Navis Manage) and Cloud-based solutions (e.g. Procore), coupled with hardware (mobile devices, computers) bring together resources to aid in managing the construction process. Applying technology as a management tool requires utilization of software and hardware to execute project management tasks. This outcome is scaffolded by basic technology literacy and skills using software.

Direct Assessment

Course **CM400L** **C4P Lab 3** ***Course Learning Outcome:*** manage project information using cloud based document manaement system

Assessment: 184 Final Report- Essay question on technology Semester Assessed S22 *Score** **89%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Apply electronic-based technology to manage the construction process.

Assessment: 328 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Apply electronic-based technology to manage the construction process. Semester Assessed S22 *Score** **90%** Competent

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Evaluation

The C4P course sequence (CM200L, CM300L, CM400L) provides a unique opportunity to apply technology to manage the construction process. We utilize Procore across the lab sections to aid in managing the process. By the time students reach CM400L, they have gained considerable experience with this project management software and their performance is reflected in the assessment results. Many students use such technology in their jobs and internships, perhaps impacting their confidence as exemplified by the highly competent results on the senior survey.

Corrective Actions Taken

2021 Modified final report in CM400L to more directly assess applying technology to manage, replacing organization assignment.

Next Steps

No Action Planned

Assessment of SLO # 11

Apply basic surveying techniques for construction layout and control.

Apply Survey Techniques

Assessment of SLO # **11** **Apply basic surveying techniques for construction layout and control.**

NAU Interpretation

Basic surveying techniques for construction include performing level loops, topographic surveys and establishing location of points. Applying these techniques involves using auto levels, total stations and steel tapes to establish coordinates and elevations of points shown on construction drawings or in concert with existing conditions to determine coordinates and elevations of points. Included in this outcome are the scaffolding skills of understanding survey terminology, setting up instruments and processing survey data.

Direct Assessment

Course **CM253** **Surveying** ***Course Learning Outcome:*** Operate and perform basic measurement and layout tasks using tapes, levels and total stations

Assessment: 37 individual quiz on construction lab — Semester Assessed S22 *Score** **96%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Apply basic surveying techniques for construction layout and control.

Assessment: 329 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Apply basic surveying techniques for construction layout and control. — Semester Assessed S22 *Score** **82%** Competent

Assessment of SLO # 11

Apply basic surveying techniques for construction layout and control.

Apply Survey Techniques

Assessment of SLO #	**11**	**Apply basic surveying techniques for construction layout and control.**
NAU Interpretation	*Basic surveying techniques for construction include performing level loops, topographic surveys and establishing location of points. Applying these techniques involves using auto levels, total stations and steel tapes to establish coordinates and elevations of points shown on construction drawings or in concert with existing conditions to determine coordinates and elevations of points. Included in this outcome are the scaffolding skills of understanding survey terminology, setting up instruments and processing survey data.*	

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Evaluation

In the senior survey, students reply, on average that they are between "extremely competent" and "somewhat competent" in applying basic surveying techniques for construction and layout with a bias towards "somewhat competent". We advise students to be very careful in applying survey techniques without close supervision or additional education because it carries significant risk to the project. This may attribute to their perception that they are not competent to perform these activities. All students in the program participate in a full semester surveying/layout class with a robust lab component. During the pandemic, a fully virtual lab was established where students learn the process for leveling, mapping surveys and construction staking. In 2021 the direct assessment for this SLO was changed from an in-person lab-practical to a quiz in the new virtual lab covering construction staking.

Corrective Actions Taken

2021 Changed assessment from lab practical to construction staking quiz

Next Steps

To address responses on the student survey, we will better differentiate to student the tasks that they will be expected to complete as a field engineer onsite. We will do a better job increasing their confidence in these tasks through improved lecture examples and in-field lab activities.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 12

Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

Understand Proj. Delivery

Assessment of SLO # **12** **Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.**

NAU Interpretation *Common methods of project delivery include Design-Build-Build (DBB), CM at Risk (CMaR), Design-Build (DB) and Integrated Project Delivery (IPD). To demonstrate understanding, students must be able to differentiate contracting types and delivery methods.*

Direct Assessment

Course **CM489** **Proj. Admin.** ***Course Learning Outcome:*** Understand the role of a project manager on a jobsite and demonstrate the management skills necessary to effectively run a project including oral presentations

Assessment: 156 Quiz on project delivery — Semester Assessed F20 *Score** **97%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

Assessment: 330 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construct — Semester Assessed S22 *Score** **93%** Competent

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Evaluation

Students demonstrate high confidence in their ability to understand different project delivery methods based on the results of the senior survey, showing improvement over the past few years. The fundamentals of Project Delivery Methods are introduced in CM223 and we have seen students demonstrate the ability to differentiate among the methods at an early stage. In addition, students who complete the CM425 (Collaborative Project Delivery) Elective master this outcome.

Corrective Actions Taken

Next Steps

To better align with what we expect on the AIC exam (Project Delivery methods that are not common in Arizona, for instance), we will work to introduce additional terminology in our courses that is presented in the AIC study guide.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 13

Understand construction risk management.

Understand Risk Mgmt.

Assessment of SLO # **13** **Understand construction risk management.**

NAU Interpretation *Risk on a construction project includes safety hazards, financial risk and contractual risk. To demonstrate understanding, students need to be able to summarize factors that contribute to these risks and identify ways of mitigating those risks.*

Direct Assessment

Course **CM489** **Proj. Admin.** ***Course Learning Outcome:*** Understand the intricacies of differing contractual relationships between an owner and a contractor that affect the way a project should be approached and ran.

Assessment: 189 General Conditions Risk assessment assignment — Semester Assessed F21 *Score** **93%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand construction risk management.

Assessment: 331 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand construction risk management. — Semester Assessed S22 *Score** **95%** Exemplary

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students demonstrate competent to exemplary performance in understanding construction risk management. They report a confidence in their ability to meet this outcome as well. Data for a few years on this SLO is missing, however, performance has been maintained.

Corrective Actions Taken

Next Steps

No action planned

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 14

Understand construction accounting and cost control.

Understand Cost Control

Assessment of SLO # **14** **Understand construction accounting and cost control.**

NAU Interpretation *Cost control, monitoring and accounting on a construction project serves the purpose of recording financial transactions and measuring progress on a project relative to projections. To demonstrate understanding, students must be able to describe these processes and their relationships to the construction profession.*

Direct Assessment

Course **CM490C** **Capstone** ***Course Learning Outcome:*** Develop a cost / schedule control system that can be used to project variations in schedule, budget, and cash flow

Assessment: 161 Pay app Assignment Semester Assessed S21 *Score** **96%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand construction accounting and cost control.

Assessment: 332 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand construction accounting and cost control. Semester Assessed S22 *Score** **84%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Senior Survey confidence in understanding construction accounting and cost control was historically low, but improving. Assessment data was lost from Fall 20 and Fall 21 as a result of miscommunication with part-time faculty. The marginal performance, coupled with loss of data indicates that this area of the curriculum requires attention and potential improvement.

Corrective Actions Taken

2021 moved assessment from Admin (CM489) to capstone (CM490c)

Next Steps

For fall of 2022, we will add in an 'Application for payment assignment' into CM489 (Project Administration) to better assess student performance.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 15

Understand construction quality assurance and control.

Understand QA/QC

Assessment of SLO # **15** **Understand construction quality assurance and control.**

NAU Interpretation *Quality assurance and quality control (QA/QC) are a set of processes used to ensure that resulting products meet required standards. Students create checklists and implement quality control plans to demonstrate understanding in this area.*

Direct Assessment

Course **CM481** **Operations** ***Course Learning Outcome:*** Understand Quality Control and Create a Quality Control Checklist

Assessment: 190 Quality Control checklist assignment — Semester Assessed S22 *Score** **100%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand construction quality assurance and control.

Assessment: 333 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand construction quality assurance and control. — Semester Assessed S22 *Score** **91%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students perform well on the Quality Control Checklist assignment in Operations (MC481) This is confirmed by their high level confidence in their ability to understand construction quality assurance and control in the senior survey

Corrective Actions Taken

Next Steps

No action planned

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 16

Understand construction project control processes.

Understand Proj. Control

Assessment of SLO # **16** **Understand construction project control processes.**

NAU Interpretation *Construction project control processes are concerned the interrelationship among cost, schedule, logistics and materials on a project. Students illustrate the relationships among these influences to demonstrate understanding.*

Direct Assessment

Course **CM481** **Operations** ***Course Learning Outcome:*** Create and implement a project procurement system and understand how this relates to the successful management of a jobsite

Assessment: 153 Procurement log assignment Semester Assessed S22 *Score** **87%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand construction project control processes.

Assessment: 334 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand construction project control processes. Semester Assessed S22 *Score** **93%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students consistently demonstrate a competent level of performance in understanding construction project control processes. Their self-reported confidence is at a similar level of competence.

Corrective Actions Taken

Next Steps

No action planned.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 17

Understand the legal implications of contract, common, and regulatory law to manage a construction project

Understand Legal & Contract

Assessment of SLO # **17** **Understand the legal implications of contract, common, and regulatory law to manage a construction project**

NAU Interpretation *Regulations, contracts and common law affect the management of a construction project. Students demonstrate understanding by interacting with legal documents specific to the construction profession.*

Direct Assessment

Course **CM489** **Proj. Admin.** ***Course Learning Outcome:*** Understand the intricacies of differing contractual relationships between an owner and a contractor that affect the way a project should be approached and ran.

Assessment: 158 Buy-out Assignment — Semester Assessed F20 *Score** **100%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand the legal implications of contract, common, and regulatory law to manage a construction project.

Assessment: 335 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand the legal implications of contract, common, and regulatory law to manage a construction project. — Semester Assessed S22 *Score** **87%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Student confidence with legal concepts is competent and improving based on the senior survey. In Project Administration(CM489), students demonstration proficiency in interacting with legal documents common to the construction profession. We have identified some room for improvement in this outcome.

Corrective Actions Taken

Next Steps

In future CM489 (Project Administration) classes, we intend to expand the content from just analyzing scope to include broader legal documents.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 18

Understand the basic principles of sustainable construction.

Understand Sustainable Principles

Assessment of SLO # **18** **Understand the basic principles of sustainable construction.**

NAU Interpretation *Basic principles of sustainable construction include optimizing resource use, issues related to siting, minimizing waste, enhancing indoor environmental quality and considering full life-cycle costs. Students demonstrate understanding of these principles by using them in the context of construction materials and systems.*

Direct Assessment

Course **CM120** **Human Environment** ***Course Learning Outcome:*** Understand the fundamental concepts of sustainable devlopment and environmental building

Assessment: 6 Dream House Project Semester Assessed S22 *Score** **100%** Exemplary

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand the basic principles of sustainable construction.

Assessment: 336 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand the basic principles of sustainable construction. Semester Assessed S22 *Score** **90%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students demonstrate confidence in their ability to understand the basic principles of sustainable construction based on our senior survey and have shown improvement in this confidence over time. The CM120 project is a broad introduction to many sustainable principles and students clearly demonstrate exemplary performance in completing the 'dream house project'.

Corrective Actions Taken

Next Steps

Based on industry trends and responses of students who take our Sustainable Construction Elective (CM403), this is a topic that needs to be more integrated into our curriculum beyond CM120, CM223 and CM236. Our new Advanced MEP course (CM426) will add exposure to this and we will explore ways to integrate more sustainable principles into Capstone (CM490c) Operations (CM481) and Project Administration (CM489).

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 19

Understand the basic principles of structural behavior.

Understand Structural Principles

Assessment of SLO # **19** **Understand the basic principles of structural behavior.**

NAU Interpretation *Basic principles of structural behavior include loading determination, load path tracing, mechanical properties of materials, basic static equilibrium and component behavior (beams, columns, foundations). Students demonstrate understanding by applying loads and determining resulting behaviors using principles and design aids.*

Direct Assessment

Course **CM331** **Steel Systems** ***Course Learning Outcome:*** Perform structural analysis of simple buildings and building components

Assessment: 129 Final Exam Questions — Semester Assessed F21 *Score** **93%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand the basic principles of structural behavior.

Assessment: 337 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand the basic principles of structural behavior. — Semester Assessed S22 *Score** **89%** Competent

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0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
1= Extremely Competent (100%) 2= Somewhat Competent (75%) 3 = Neither Competent or Incompetent (50%) 4= Somewhat Incompetent (25%) 5= Extremely Incompetent (0%)

Evaluation

Students demonstrate competence in understanding structural principles. They are introduce to this topic in structures (CM220) and are reinforced in basic structural behavior in the Steels class (CM331). While not as high as with other outcomes, the students still report a competent level of understanding of this topic

Corrective Actions Taken

2020 changed assessment from homework assignment to a comprehensive final exam because many students were not completing the homework assignment

Next Steps

No action Planned.

NAU NORTHERN ARIZONA UNIVERSITY
Construction Management

Assessment of SLO # 20

Understand the basic principles of mechanical, electrical and piping systems.

Understand MEP Principles

Assessment of SLO # **20** **Understand the basic principles of mechanical, electrical and piping systems.**

NAU Interpretation *Mechanical, Electrical and Plumbing (MEP) systems are the complex life-blood of a building. Students demonstrate understanding by explaining the basic function of each of these systems.*

Direct Assessment

Course **CM326** **MEP** ***Course Learning Outcome:*** Identify the means, methods, and materials commonly used in the construction of commercial building MEP systems

Assessment: 115 MEP Coordination Exercise — Semester Assessed S22 *Score** **89%** Competent

Indirect Assessment

Course **SR_Surv** **Senior Survey** ***Course Learning Outcome:*** Understand the basic principles of mechanical, electrical and piping systems.

Assessment: 338 Having completed your studies in Construction Management at NAU, please rate your ability to do the following? - Understand the basic principles of mechanical, electrical and piping systems. — Semester Assessed S22 *Score** **89%** Competent

** 'Score' shown for Direct Assessments is percent of students who meet or exceed the threshold of 70% on the assessment*
0% -- Unacceptable -- < 50% -- Deficient -- <70% -- Satisfactory -- <80% -- Competent -- < 95% -- Exemplary- 100%
Indirect Assessments are mapped as such:
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Evaluation

Based on Senior Surveys, Students demonstrate confidence in their ability to understand MEP systems. This is supported by performance on the MEP coordination exercise in CM326 (MEP systems), however early deficient scores may be attributed to the nature of the assessment.

Corrective Actions Taken

2021 Introduced Advanced MEP course which will be required for students starting in Fall of 2021

Next Steps

Starting in Fall 2021, we are offering an Advanced MEP elective (CM426) which will become required for the cohort of freshmen starting in Fall of 21. This will increase student exposure to MEP topics, hopefully improving performance in this area.