Master of Sustainability Solutions Culminating Experience Guide

2021-2022

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MSUS Culminating Experience Guide

1.0 Introduction

Welcome to the Master of Sustainability Solutions (MSUS) Culminating Experience (CE) Guide. The CE, in the form of an applied project, is how MSUS students demonstrate their knowledge of sustainability and their assimilation of the five sustainability competencies: systems, values, interpersonal, anticipatory, and strategic thinking. The management and execution of your project is the primary source of evidence the MSUS Committee and the SOS 582 and SOS 593 course instructors will use to evaluate a student's mastery. This document outlines the purpose of the CE within the MSUS degree program and how to execute a successful project.

MSUS students are required to complete a team-based project plan, which must be approved by the MSUS Committee, as part of the SOS 582 Project Management course. The proposed team project is then carried out in the SOS 593 Applied Project course. Each team must publicly present their project results and deliverables to the MSUS Committee and the School of Sustainability for evaluation.

Team-based culminating experience projects are the optimal vehicle for both sustainability and student learning outcomes. Sustainability practitioners rarely work alone to address complex sustainability problems. The team-based CE gives MSUS students critical experience that is valued in most sustainability professions.

This guide articulates the process, expectations and requirements for students completing their MSUS CE. The Culminating Experiences section, immediately following this introduction, is an explanation of the mission and purpose of the CE and describes the role of the MSUS Committee. The Project Development section describes how projects are selected and assigned as well as how the assignments and learning objectives for SOS 582 Project Management help students create a project plan.

 Your CE fits into the context of your MSUS experience and the process of preparing, developing, and executing your CE.

A section on "Additional Resources" offers some places to look for project ideas, project partners, research, and some sustainability tools.

2.0 Culminating Experiences

What is the CE and why is it a degree requirement? There is a plethora of research coming from all scientific disciplines that characterize the current state of the environment, people, and the economy. There are far fewer applications of that knowledge in the service of normative aspirations and desirable, sustainable, future visions. The MSUS program is designed to (1) prepare students to use research as the building blocks for creating a more sustainable future, (2) provide a platform for students to envision and create productive and sustainable outcomes.

2.1 CE Mission and Purpose

2.1.1 Connect students with projects

The MSUS CE is a student's opportunity to work on a team-based sustainability challenge. The most successful CE experiences are driven by the commitment of team members. Conversely, the least successful projects lack student investment. Student teams that embark on difficult projects in areas in which they commit themselves intellectually, find it easier to dedicate time to the project, consistently find the means to surmount barriers, and produce higher quality project deliverables.

2.1.2 Demonstration of sustainability knowledge

The MSUS curriculum emphasizes sustainability competencies and applied sustainability tools and frameworks. Students' CEs should reference and reflect the knowledge gained in the MSUS program. CEs should demonstrate familiarity with these sustainability competencies and applied sustainability tools and frameworks. and apply them to practice.

2.1.3 Demonstration of ability to implement and extend knowledge

Through the CE students take the next step as sustainability professionals and operationalize their knowledge -- moving from what to how. The CE should contribute to the existing knowledge base by identifying and then addressing a knowledge gap, or adapting and implementing a method to address a sustainability challenge. Merely qualifying or quantifying the current state, such as documenting a company's greenhouse gas (GHG) footprint, is insufficient as a CE deliverable. Developing new pathways to reduce that same company's GHG production is a path to implementation. Overall, the team-based CE should be a demonstration of a students' leadership and ability to apply existing knowledge to address a sustainability challenge.

2.1.4 Career Preparation

The CE is designed to develop skills that are in demand by potential employers. Every project should help student teams prepare for a career after completing the MSUS program. This career preparation can be done within the CE scope by applying the sustainability competencies, tools, skills, and frameworks learned in the MSUS program to address practical sustainability challenges, increasing specialized knowledge, addressing sustainability elements specific to an industry, using special technology, and communicating with clients and sponsors. Students also benefit from engaging in team-based work, which is typical in professional settings.

Regardless of the topic or deliverables, the CE is designed to build students' interpersonal skills like task management, conflict resolution, and negotiation – all of which are critical skills in sustainability professions.

2.1.5 Build Sustainability Competency

One purpose of the CE is to build student competency and capacity through the planning and execution of the CE.

First and foremost, it is critical that students can take a sustainability challenge and create a project management plan that creates an appropriate response to that challenge. Project Management skills include: creating a project scope; identifying desirable outcomes; gathering resources; assembling stakeholders; developing response strategies; planning project-specific tasks; communicating with team members and stakeholders, and coordinating timelines.

The SOS faculty and administration expect each student to develop 5 core competencies during their time in the program. Students should be able to demonstrate those competencies as they execute their CE.

A. **Systems thinking** - Every student should be well versed in systems thinking and demonstrate their knowledge of interconnected variables and their effects on each other over time. Knowing that systems can operate at multiple scales, cross various boundaries, and have effects that emerge on varying timelines is critical to developing intervention and transition strategies.
B. **Anticipatory Thinking** - As students develop intervention strategies, they need to think critically and forecast probable outcomes. Anticipatory thinking is critical for developing future scenarios absent interventions, and sustainable visions resulting from interventions.
C. **Strategic Thinking** - To develop transition strategies, leading to a more sustainable future, strategic competence is required. Students must be able to design and implement interventions that lead to positive outcomes.
D. **Normative Thinking** - Without a map of sustainability values, principles, goals, and targets, future visions have no purpose, and strategies are without direction. Normative competence might be better understood as our collective thoughts about what is important to society as we move forward. Protecting the ability of future generations to enjoy the benefits of our planet's resources, is an example of normative thinking.
E. **Collaborative/Interpersonal** - All of the above competencies rely on collaborative or interpersonal competence, especially normative competence. Without the ability to elicit common values, co-create knowledge and strategies, intervention strategies are neither targeted nor visionary. Interpersonal skills are critical for both collaboration and consensus. They are also vital to the success of the team-based CE.

2.1.6 Foster Leadership Capacity

Outside of the core competencies are another set of competencies prized by academics, practitioners, and enterprise leaders. The MSUS CE is designed to help you grow in these areas, and become resilient, resourceful leaders.

A. **Grit** - Working in the sustainability field brings many challenges and seemingly insurmountable odds. The same is true in the relatively protected SOS environment, particularly when completing the team-based CE. Students are expected to demonstrate resilience in the face of challenges and get the job done. Perseverance in the face of difficulty is a critical leadership quality.
B. **Creativity** - Getting the job done will likely mean pivoting and adapting.   Successful students have shown the ability to create alternate solutions as they proceed to the end goal.
C. **Creative Problem Solving** - As your team completes its work through your CE, guaranteed, things will not go as expected-it's almost guaranteed. Ask most MSUS alumni if their project went as expected, and a large majority will respond negatively. Prior preparation may not be enough, and thinking on your feet to creatively turn challenges into positive outcomes is a useful competence, for both your CE and your career.
D. **Innovation** - All students will have the opportunity to innovate within their CE, including using novel methods or tools that help advance solutions. You will have a powerful story to tell potential employers, and make yourself more marketable upon completion of their project and degree. If you develop these competencies you are more likely to create outcomes of value for yourself, your CE team members, your project stakeholders, and the SOS community.
E. **Stakeholder Engagement** - At SOS we know that legitimate, coherent, nuanced, motivational, and shared outcomes are unlikely to be achieved without stakeholder participation. MSUS projects that do not engage stakeholders are not considered sustainability solutions, nor are they acceptable for fulfilling the degree requirements.
F. **Service Learning** - Part of the mission at SOS is to make a positive impact within the communities where we work and/or develop projects. Service learning fosters creativity, experimentation, and freedom for students to gain leadership experience.
G. **Representing ASU** - Being out in the community means you not only represent yourselves and your families, but you are the face of ASU and SOS. Your professionalism should reflect your respect for the outside community, the reputation of fellow ASU students, and SOS faculty, staff and peers. Make the most of your opportunity to train yourself for a professional career by developing skills and relationships that honor your origins. Comradery, future support, and collaboration opportunities are often built on the professional comportment you develop and exercise while completing your CE.

2.2 MSUS Committee Role and Review

The MSUS Committee is the team of SOS faculty who oversee and monitor student CE progress. Membership consists of rotating SOS faculty members, the SOS 582 instructor, and the Graduate Academic Success Coordinator. The overarching goal of the committee is to ensure that student projects are a success and meet student's goals and objectives, as well as those of SOS. The MSUS Committee's role is advisory and is designed to make sure the student work meets the academic requirements of the MSUS program, and that the student teams apply the appropriate scientific means and methods of investigation. Each team will have one MSUS Committee faculty member serve as a primary reviewer and one secondary reviewer. The primary reviewer will serve as the main point of contact for feedback and a detailed review of their work throughout the CE process.

The committee will provide constructive criticism and general feedback as you plan and execute your CE project. Because the MSUS CEs are team-based projects, unlike MA or MS students, MSUS

students are not required to have an individualized advisory committee and therefore the MSUS committee is more of an oversight body than are MS/MA advisory teams.

2.2.1 MSUS Committee and SOS 582/593 Instructor Expectations

Graduate students are expected to be self-directed, self-motivated, and self-policing. Students are expected to manage their projects and time professionally, and accept the consequences when they don't meet academic expectations, or delivery timelines. If commitments are made for deliverables and timelines in the project management plan, students' must present the work as promised and in a timely fashion. When there are extenuating circumstances beyond a student's control, students must work with all parties involved, as soon as circumstances change, so they can assist in troubleshooting or damage control. The MSUS Committee and the SOS 582/593 instructors may not be able to help at the last minute. Students are advised to contact them early when problems arise.

2.2.2 MSUS Committee Review Timing

Most of the MSUSCommittee review is pre-arranged in accordance with the SOS 582 Project Management and SOS 593 Applied Project course syllabi.

A. **Scheduling with the Review Team** - Students or CE teams should schedule meetings with SOS 582/593 instructors as project needs dictate. Contact with the MSUS Committee may be forwarded through the instructors, but students are strongly encouraged to build relationships directly with them.
B. **Anticipating Review time** - Anticipatory thinking starts with the CE project and review process, especially when it comes to project reviews by the Committee. Students need to get documents to the Committee, especially their primary reviewers, with sufficient lead time to allow them to comment, and then for the student to respond to the review. The timing of submittals and reviews are built into the SOS 593 Applied Project course syllabus. Consult your course instructor(s), if you have questions about the project timeline.
C. **Interim Reviews** - Keeping your MSUS Committee reviewers aware of project progress is a good way to stay on track with a CE project. Their feedback can preempt unnecessary effort and help you troubleshoot barriers to progress. Discuss and set a meeting schedule with them prior to starting project work.

3.0 PROJECT DEVELOPMENT

The CE experience has two course components: SOS 582 Sustainability Project Management and SOS 593 Applied Project.

In SOS 582 students learn project management concepts, methods, and tools in the classroom, define the scope and mission of their team's CE, and develop a CE project management plan as a part of the course. The team-based projects will anchor the theoretical work and project partners will be assigned in August. Teams will work together to develop their project plans that will be executed in spring. All of the deliverables in fall will build towards the spring delivery. Topics covered in SOS 582 include:

1. Working with project partners to define the problem
2. Identifying relevant stakeholders and develop a communication plan
3. Applying sustainability competencies
4. Identifying key literature to anchor the problem
5. Developing a project schedule
6. Determining how to monitor progress and assess risks
7. Presenting project proposals to critical audiences and managing feedback
8. Finalizing the CE plan

The next semester in SOS 593, student teams will execute their project according to the project management plan developed in SOS 582. Clear outcomes should be collaboratively identified by the MSUS students, their project partners and stakeholders. Qualitative and/or quantitative metrics are needed to ensure that outcomes meet or exceed expectations, or require re-formulation of strategies for success.

3.1 Project Selection and Assignments

3.1.1 MSUS Curated Projects

The MSUS Committee solicits CE ideas from community partners and faculty who have identified a sustainability need or project within their organization. The SOS 582 instructor reviews potential CE ideas for their suitability and discusses them with the project partners prior to approving them as an option to include as a potential MSUS CE project . In SOS 582, MSUS students are provided with the approved list and description of available CE projects. Students' input will be considered during project assignment.

MSUS CE Project partners come from all sectors of life and business. On campus, multiple organizations like University Sustainability Practices (USP), Office of the University Architect (OUA), Facilities and Grounds, and Food Services (through Aramark) often propose sustainability projects for students to work on. Outside organizations include, but are not limited to businesses, non-profits, governing bodies, or citizen groups.

3.1.2 Student Identified Projects

Students that choose to propose a project, not from the School of Sustainabiltiy's curated list of projects will be required to submit their project plan using this form to the MSUS

Committee for approval by May 1st (i.e., the end of the semester preceding SOS 582). Then notify the Graduate Coordinator via email upon submission of the completed form. This plan must identify potential CE and project partner(s). This project must fulfill the MSUS CE project criteria, including potential for it to be team-based. Partnering with a Project Partner.

3.2 Building relationships

Partnerships provide value to students and their partner organizations, so working with partners requires all parties to understand what is required of them. SOS faculty and staff have ongoing relationships with these organizations so it is important for students to nurture those project partner relationships. The best and simplest ways to do so are to listen to what partners need, discuss what their vision is for their project, and co-develop pathways to improvement with them.

3.3 Co-creating project goals and objectives

The process of developing project goals and objectives needs to be a collaborative process with the project partner. Negotiating this part of the project aligns your team's goals with the project partner, and provides a glimpse into your future working relationship.

3.4 SOS expertise

Students are encouraged to consult with the MSUS Committee Member serving as their team's primary reviewer for advice and information. Students are also encouraged to contact SOS faculty who specialize in the team's project area. Search SOS faculty [profiles](#) and also consider the broader community of [ASU faculty focused on sustainability](#).

3.5 Building a Project Team

Every student offers unique skills to their CE team. CE teams should meet to discuss each members' skills, strengths, and tools. In doing so, teams can learn about skill or knowledge gaps and address them before their project starts.

3.6 Developing a CE Project Plan for Review by the MSUS Committee

3.6.1 SOS 582 Project Management for Sustainability

All students must enroll in SOS 582 Project Management for Sustainability prior to executing their CE in SOS 593 Applied Project. SOS 582 builds students' project management capacity through experiential project work and in-class presentations. Students learn how to create a project management plan, and project management tools and techniques. During the semester they select a team-based CE project,develop the project's scope, create a communication plan, assess risks, and create a preliminary and final project proposal. Students will also submit their plan and present their work to the MSUS Committee for feedback during the semester. Refer to the SOS 582 syllabus for relevant dates and deadlines for submission to the MSUS Committee. Developing a CE Plan

The major deliverable of SOS 582 is the team-based CE plan, which entails a detailed, plausible, coherent, and well written explanation of the CE project. Students showcase their

understanding of sustainability and demonstrate professionalism in both the written document and their presentations to the MSUS Committee and project partners. In addition to mapping out the team-based CE plan, the intent of SOS 582 is to gain experience in writing proposal documents, and to acquire professional project management skills.

The preliminary CE plan describes the CE project and sustainability challenge, identifies key literatures to review, describes critical stakeholders and potential sustainability frameworks used to assess the challenge. Students present a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis in the document. The MSUS committee provides student teams feedback on their preliminary plan, which students are required to address prior to submitting their final plans.

The final CE plan should be a polished version of the preliminary plan and include additional sections, such as a more formalized project narrative, work breakdown structure, and risk management plan. Additionally, the CE plan should be accompanied by a document that responds to each of the MSUS committee suggestions and provides specific information on how the CE plan changed in response to the MSUS committee feedback. CE plans will receive feedback from the MSUS Committee and their relevant project partners. CE teams will present their CE plans to the class, the MSUS committee, project partners, and to MSUS peers.

Even the best project management plans can get derailed. The best project managers are aware of this possibility and always have a backup plan. Student teams are advised to consider a "Plan B" project in case unanticipated roadblocks arise and they need to pivot.

A. **Scope and Charter -** Co-developing requirements with project partners is integral to the creation of a scope and charter. Project partners provide background for the project from their perspective, and can describe the relevant issues. As project managers you and your CE team must record this information, frame its connection to sustainability, and set out a project plan to address the sustainability challenge. In the planning process your team will identify the project purpose, how the project work is supported by the courses you've taken, and how it furthers your professional goals. Outcomes, stakeholders, engagement and implementation methods, project partner deliverables, and project timelines are defined in detail. Of all of these things, the most important to the project partner, is the content and timing of deliverables and other project outputs. Setting reasonable and achievable expectations on both sides will set the project on the right path.

   CE teams should determine each team member's interests and duties in the project and how these tie to professional goals and previous coursework. Teams will complete an accountability contract and attach it to their project proposals. Contracts should include a team member bill of rights, a code of cooperation, team-member's skill self-assessments, a leadership distribution plan, an end-of-project peer review process, and a conflict resolution plan.

   In the Scope and Charter section each student must frame the project using the five characteristics of a sustainability problem:urgent, highly complex, life altering, have dispersed effects, and involve contested solutions. Students are not being asked to solve global problems, but to contribute to solving global problems with local solutions. However, the local piece of the problem and its solution must be placed into perspective with the global problem.

B. **Project Resource**s - All projects require financial and human resources and those resources must be allocated as required by the project. Therefore, team members and roles must be defined, costs estimated, work structured, tasks assigned, and timelines defined. As with other project elements, resource allocation is a collaborative process requiring input from all participating team members. Since time is a vital resource, detailed timelines, in the form of milestones or charts, are critical components of the project proposal.

Teams are expected to distribute and assign the workload of each team member. The project proposal should identify the tasks assigned to each team member, and do the same on the Gannt chart and work breakdown structure. Working together on the project proposal should give you a preview of how the team will interact during project execution. Make note of things that don't go smoothly in the proposal process so conflict can be resolved early and especially before the project work begins.

C. **Communication and Engagement Plan** - In project work, clear communication makes a project run smoothly. Lack of communication can sabotage meaningful progress. Communication plans are needed to ensure that team members and stakeholders are informed in a timely and efficient manner. Your project proposal should articulate target audiences, methods, means, motivations, and timing for key communications. Communication and engagement between student practitioners are especially important in team-based projects. Team proposals should identify the means and methods for collaboration, including multiple contact methods for each team member, accessible repositories for resources and documents in progress, regular meeting times, and other plans to maintain the flow of work and information.

D. **Risk Management Plan** - A key component in project success is anticipating potential risks and preparing plans to avoid, mitigate, or adapt to the consequences of those risks. Risks can have either a positive or negative impact on a project. Identifying and planning for risks to the furthest extent possible, at the beginning of a project, can save time and resources later on. This section should demonstrate that students have anticipated risks and developed contingency plans.

Team work requires managing risks among team members. Think about how you would cope with the loss of a team member's services due to illness, family emergency, or other circumstances, and develop contingency plans. Some contingency measures might be project scope reductions, extended timelines, distributing unmet workloads, or finding temporary help. Clients might want to know about your contingency plans as well, so keep them informed, especially if your loss of capacity could affect their ability to function.

As is the case in professional settings, conflict within the team is another source of project risk and can freeze progress if unresolved. A written agreement between team members about conflict resolution, developed before a conflict happens, is an essential tool. The agreement should include rules of engagement, resolution processes, and a list of arbiters or mediators that can facilitate resolution. Doing so will increase the productivity of the team and the overall strength of the CE project. CE teams should attempt to resolve any collaboration issues themselves prior to involving the instructor. In some cases, a rebalancing of the initial work plan may be necessary.

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Each CE team will evaluate the contributions of team members (in confidence) after submitting their final class deliverables. This peer evaluation grade is separate from the CE project grade and has a significant influence on the final course grade.

3.7 CE Project Completion and Final Deliverables

If expectations for deliverables and outputs were agreed to by the project partner and project team, closing out the project should mostly consist of turning deliverables over to the MSUS Committee and project partner, and if necessary communicating logical next steps for moving forward. In some cases, it may be wise to hand over contact information, documents, and important knowledge sources. Be sure to reference the SOS 593 syllabus and instructor's guidelines for all assignments, due dates and deliverables.

There are multiple deliverables required for every MSUS CE project. The major items are the products delivered to the client/partner, an executive summary, a final project report, a personal reflection, and a public presentation of the project. MSUS CE project deliverable templates for items deliverable to the MSUS Committee will be provided by the SOS 593 instructor on the course site after the start of the semester. Deliverables for the project must be submitted in accordance with the SOS 593 course calendar on the syllabus. Final deliverables are due to the committee two weeks before the last day of classes.

3.7.1 Draft of Deliverables

Halfway through the semester, students are required to provide a draft of their project deliverables for review by the instructor and MSUS Committee. If revisions to project scope and goals, timelines, or outputs are necessary due to new understanding of the challenges or other circumstances, then the draft final deliverable should identify changes to scope, timeline, outcomes, and client deliverables. Students should work with their primary MSUS faculty reviewer, and/or the SOS 593 instructor, to determine what changes to the project warrant inclusion.

3.7.2 Executive Summary (template provided in 593 Applied Project course)

The executive summary should tell the compelling story of your CE from the problem statement to the outcomes, and be built as a brief recap of the project and deliverables. It is primarily intended to tell the MSUS Committee what you did, why you did it, how you did it, and the outcomes of what you did in a single page. Additionally, the summary should identify next steps for fellow scholars or stakeholders interested in continuing your work. Finally, it should identify significant challenges and opportunities that arose during the execution of the project. The summary should be submitted as a separate document for posting on the Sustainability Connect website database. Be sure to understand what your project partners and stakeholders will allow to be disclosed on the executive summary, and what should be kept private before releasing it for posting.

3.7.3 Reflection Paper (template provided in 593 Applied Project course)

The 1-3 page reflection is intended to delve into a student's learning experiences during the execution of the project. The student should introduce their sustainability perspective prior to

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project start, discuss how the project changed your sustainability perspective after you completed the project. Students should talk about the impact and usefulness (positive or negative) of the work on their career and professional goals. It will also include project management lessons learned, implementation of project management tools, and what could have been done differently. Alert us to the biggest barriers and aids to the completion of the work, as well as what your project accomplished for your client. Finally, speak to the applicability of the MSUS coursework to the project. Tell us what was most helpful and what pieces were missing. This is an opportunity to identify what was valuable from the experience, share it with those who follow in your footsteps, and pass on constructive criticism to SOS faculty, staff, and administration.

3.7.4 Project Presentation

The final presentation will be delivered to the project partner, class and MSUS Committee. It will take place at the end of the semester (refer to the SOS 593 syllabus for specific dates and deadlines). The purpose of this deliverable is to provide a succinct overview of your project and learning experiences to student peers and the MSUS Committee.
Students unable to appear in person to the MSUS Committee may petition the committee to use an alternative (remote) presentation delivery method.

3.7.5 Sustainability Connect & KEEP Upload

After all project deliverables are completed and approved, students are asked to provide an executive summary for upload to the Sustainability Connect project database, by the database coordinator. Deliverables, published manuscripts, or other media related to the project, may be archived in the ASU Library's KEEP Graduate Culminating Experience Collection and linked from the Sustainability Connect database. The repository release form must be filled out by the project stakeholders and submitted with all project documents to the SOS 593 course instructor. The two reasons for making your documents available are to create a sustainability solutions database and a source of project ideas for future students and project partners. Additionally, students can point potential collaborators or employers to a trusted source, verifying a student's credibility.

3.8 MSUS Committee Approvals and Grading

The MSUS Committee has oversight authority on the worthiness of CE project plans, as well as work product generated during project execution, and after project completion. A student's work is reviewed by the Committee whose feedback is then shared with the SOS 593 Applied Project Instructor and then the student. The student has the opportunity to incorporate the Committee's comments prior to the assignment of a final grade by the SOS 593 Course instructor.

Grading for CE work products submitted in SOS 582 Project Management for Sustainability is done by the course instructor(s). Final grades are based on student performance on graded assignments submitted throughout the semester. Refer to the syllabus for details.

For students working on their projects and enrolled in SOS 593 Applied Project, the MSUS Committee provides review comments to the students but the SOS 593 Applied Project course instructor assigns the final grade with Committee input. Grades of B- or lower will result in the student needing to retake the class, per university policy.

3.9 Disclosure and Repository

As part of the closeout process you will need to provide instructions with SOS staff about access to documents and other records produced on your project. Students and some project partners may not want project related information, proprietary to their project or organization, disseminated beyond the stakeholders. Project partners who have requested Non-Disclosure Agreements (NDA) from an MSUS student must provide permission before access to deliverables can be granted. The student must work with the project partner at the end of the project to provide a document to SOS staff outlining information disclosure restrictions.

When disclosure requirements are completed, students must then redact their projects as needed for inclusion in the ASU KEEP Repository inthe [SOS Applied Project Collection](#) or declare their project ineligible for inclusion. In either case, students are required to prepare a project Executive Summary (template provided in 593 Applied Project course) and a Project Abstract for posting in the Sustainability Connect database to provide information about what was done without revealing sensitive content. Project Executive Summaries will then be posted on the site with links to the SOS Graduate Culminating Experience Repository. Executive summaries for projects excluded from the KEEP Repository collection will still be visible to the public without a link to the Graduate Culminating Experience Repository. Links on Sustainability Connect will take users to the KEEP Repository where project abstracts and files are viewable.

3.10 Setting Timelines

A. **Project Timelines -** Mapping milestones, task durations, and critical path relationships onto timelines, helps students manage the progress of the project. Setting goals for completing tasks, and recognizing the order in which tasks must be completed, brings professionalism to the project and builds credibility with a student's project partners.

B. **Academic Timelines -** CE project timelines are inextricably linked to the ASU academic calendar in general and to the timing of Committee faculty interface with MSUS students enrolled in SOS 582 and SOS 593. Therefore, project timelines must synchronize client deliverable deadlines with the ASU academic schedule. If timeline coordination is overlooked, then faculty review of your project work could be delayed, postponing project completion, and ultimately, completion of your MSUS degree. Be sure to build in academic and client review time wherever needed to avoid preventable delays.

3.11 Academic Expectations

A. **Writing Quality -** As graduate students, it is assumed that you have a strong command of vocabulary, syntax, and grammar. Consequently, in work delivered to clients, SOS 582 and SOS 593 course instructors, and the MSUS Committee; expectations for concise, direct, and logical discourse, are high. To ensure that you deliver on these expectations, leave time for multiple rounds of self-editing, and invite student peers to review project work before submission. Schedule a one-on-one appointment at ASU's [Graduate Writing Center](#) (go in-person to Noble Library, or seek [online support](#)) where students in language arts tutor students needing help. Use all the writing tools available, especially spell check software.

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B. **Academic Integrity** - The university's academic integrity policy outlines types of academic integrity violations. It's recommended that students review this page and the resources provided. The policy lists five broad areas of academic integrity. It's important to know that this is not an all inclusive list.
   1. Cheating on an academic evaluation or assignment
   2. Plagiarizing
   3. Academic deceit, such as fabricating data or information
   4. Aiding academic integrity policy violations and inappropriately collaborating
   5. Falsifying academic records

   Violating the university's academic integrity policy will not be tolerated and carries serious academic consequences. It is each student's responsibility to be aware of what constitutes a violation of the university's academic integrity policy and avoid it at all costs. Students are also expected to adhere to ASU's Student Code of Conduct. Instructors for SOS 582 and 593 use software tools to detect plagiarism on all submitted assignments. This includes all deliverables, and presentations, etc. Evidence of plagiarism can result in a failing grade for the assignment and/or the course, academic probation, and possible dismissal from the degree program.

C. **Scientific Evidence and Methodological Logic -** CE projects must be supported by scientific evidence and an appropriate methodological framework. A student's 582/593 instructors and MSUS Committee reviewers are the ultimate authorities on what is appropriate, but it is the student's responsibility to find the evidence and methods that fit best with the project.

   Whether a student plans to use literature reviews, case studies or other evidence, make sure that the use of evidence in client deliverables,, are clear in their intent. Scientific evidence must be logically connected to the work, and sources properly attributed. All resources used in planning and executing the project should be appropriately cited. Unless otherwise requested, all citations should follow APA format.

D. **Original Content -** Every CE should advance the body of sustainability knowledge in some way. Methods, frameworks, tools and programs are a few categories of knowledge advancement. It is not enough to describe and assess the current state. Providing a pathway to alter the current state or make actual improvements is required.

3.12 Delivering a High Quality CE

Working with a project partner or client means that the project scope, goals objectives, outcomes, and deliverables need to be agreed upon by the stakeholders. There are many types and formats for deliverables. Deliverables for some CEs may require several different types or formats depending on audience needs. CE teams should be mindful of their limits prior to negotiating a set of deliverables, otherwise projects may end up unfinished, with an unhappy project partner, or both. Ensure that discussions about deliverables between your team and its project partner are documented, and shared with project partners for confirmation. If any information or deliverable is private or proprietary to any project partner, make sure the information is secured from public access to the satisfaction of the partner. For academic evaluation, all deliverables need to be reviewed by the MSUS committee, but non-disclosure agreements can be requested if necessary. For public

presentations or documents, confidential material may be excluded if the MSUS committee is notified in advance.

3.12.1 Tools

Complicated, multi-dimensional sustainability challenges frequently require new ways of understanding and modeling. Frameworks and assessment tools may need to be built before sustainability deficiencies can be identified, and productive strategies to overcome them can be implemented. A recent example is a software tool, built on a questionnaire, that assesses neighborhood sustainability. A tool like this can help city planners identify neighborhoods in need, or common sustainability challenges across city neighborhoods that need to be prioritized for change.

3.12.2 Management Strategies

Sometimes project partners need help in becoming more sustainable in their day-to-day operations. Production by-products or externalities fall in this category, so partners might be looking for strategies that reduce or eliminate the harm externalities generate. Greenhouse gas mitigation, energy management, and waste diversion plans codify sustainability strategies for organizations that want to reduce externalities.

3.12.3 Programs

Quite often the biggest barriers to positive sustainability outcomes are based in human behavior, which is difficult to change due to structural inertia, social pressures, or the way the human brains process change. In these situations, outreach and engagement programs can be designed to effect change. A program example might be consumer education workshops, or events, paired with new infrastructure that supports the desired behavior change.

In all of these cases the student must collaborate with the project stakeholders to determine not only what is desirable as a deliverable, but what is doable with allotted resources and time. Furthermore, the time allotted must allow for high quality measurable outputs, no matter what path is taken.

4.0 Additional resources

4.1 Sustainability Research

The [Julie Ann Wrigley Global Futures Laboratory](#) has multiple research initiatives and affiliated research programs.

- Center for Urban Innovation
- Central Arizona-Phoenix Long-Term Ecological Research

- Complex Adaptive Systems Initiative
- Consortium for Science Policy & Outcomes
- Decision Center for Desert Cities
- Food Systems Transformation Initiative
- Global Consortium for Sustainability Outcomes
- Global Development Research
- Global Drylands Center
- Resource Innovation and Solutions Network
- Swette Center for Sustainable Food Systems
- Sustainable Purchasing Research Initiative
- Urbanization and Global Environmental Change
- UREx Sustainability Research Network

4.2 SOS Academic Labs

- The Happiness Lab
- Sustainability Transition and Intervention Lab

APPENDIX - STUDENT INITIATED TEAM-BASED CES

Should MSUS students choose to propose a CE, not from the School of Sustainabiltiy's curated list of projects they proposal must:

- Describe the project (review the 'Project Attributes' section of the MSUS Culminating Experience guide for direction)
- Identify a project partner
- Accommodate a team-based format
- Submit the proposal to the MSUS Committee for approval by May 1st

To qualify as an MSUS CE, multiple criteria must be met and the project must be measured against those criteria.

All CE projects should allow students to engage core sustainability competencies in the execution of their CE and have an identifiable connection to sustainability. From the practical side the project must: address a sustainability challenge; be a feasible scope for a student or team of students to execute; have stakeholder support and engagement; have clearly identified outcomes; broaden participating students' skills and knowledge; put the MSUS student in a leadership role, and; fit the students' passion and goals.

A1.0 Competencies Required

A. **Systems thinking** - Projects should address complex problems and provide opportunities for students to examine the problem constellation, the current situation, and its history, before intervention points are identified, or transition strategies are developed. Understanding the societal, economic and environmental domains, the different scales affected and systemic effects (including cascading effects), inertia, and feedback loops within a system, is necessary before any problem solving can proceed.

B. **Anticipatory Thinking** - Analysis, evaluation and problem framing help students anticipate possible business as usual scenarios, as well as predictions, scenarios, and visions for a more sustainable future. Further, understanding and accounting for risk, path dependence, inertia, intergenerational equity, and prevention is critical to creating sustainability solutions. Demonstrating anticipatory competence should not only be part of the CE project management plan but evident in the results of the work.

C. **Normative Thinking** - Before creating visions for a sustainable future, the ability to map, specify, and negotiate shared values is key. Students should be familiar with social justice, equity, socio-ecological integrity, and ethical issues when normative frameworks are being developed.

D. **Strategic Thinking** - To reach a vision for a future based on shared values, students should be able to create intervention strategies that support the vision and the value system. They must be able to collaboratively design and implement pathways to eliminate negatives: inertia, path dependence, and uncertainty. Future-oriented strategies must also take advantage of system efficiencies, viability, and positive action, while defining the metrics of success.

E. **Collaborative/Interpersonal** - Interpersonal competence is what ties the other four competencies together. Without the ability to communicate with, facilitate, motivate, and enable team members and stakeholders, the four other competencies are moot.

A2.0 Sustainability Connection

All CE projects must have a sustainability connection as the basis for exploration. Complex problems that manifest on multiple geographic, temporal, and ecological scales should be the focus. Every project should identify the five characteristics of a sustainability problem. The problem should be highly complex with dispersed effects and no simple solutions. Further, it must be urgent and life threatening.

A3.0 Project Feasibility

The scale and complexity of the project should not be beyond the resources of the MSUS student or team. Projects must fit within the goals, academic timeline, financial budgets, and capacities of the students. That is not to say that students cannot increase their own capacity by tapping into other partnerships or seeking assistance from other scholars. In fact, students are encouraged to include outside expertise to increase the credibility of their work.

A4.0 Stakeholder Support

Engaging relevant stakeholders is necessary for project credibility, legitimacy, and acceptance. Stakeholders may include parties directly affected by the work (residents, neighbors, owners, governance organizations, etc.) and need to be included in the process of developing, deploying, and using the work product. Stakeholders should be strategically selected for maximum impact on the outcomes.

A5.0 Identifiable Outcomes

Clear outcomes should be collaboratively identified by the MSUS student(s), their project partners, and the project stakeholders. Qualitative and quantitative metrics are needed to ensure that outcomes meet or exceed expectations, or require re-formulation of strategies for success.

A6.0 Incorporates New Knowledge and Skills

CE projects should not only demonstrate a student's facility with their newly acquired knowledge and skills, but it should provide a platform from which a student can contribute new knowledge, strategies, and tools to the sustainability community's resource pool. Pushing against known boundaries is the only way to understand limitations to advancement. Further advancement and definition of boundaries through the CE process is a minimum expectation.

Be advised, the primary purpose of the CE/Applied Project is to stretch your skills, knowledge and capacities. This is not easy work and it can be physically and emotionally draining. If it were not so, then the MSUS program would not achieve its educational objectives.

A7.0 Leadership Role

Students should not expect SOS faculty to lay out their path for project success. Future employers look for leaders in the field when hiring MSUS graduates. Therefore, you should expect to show

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leadership in choosing, developing, and executing your project – either as an individual or as a contributor to a team-based project. Leadership requires planning, anticipating, and responding to project needs on a day-to-day basis. Taking ownership of the project, or parts of the larger project, is an indication of leadership and will prepare you to be a project self-starter in the future.

Within the context of a team, the leadership question must be addressed in a nuanced manner. Top down approaches require a singular vision from a leader that is followed by the team members. The co-creative approach, or collaborative approach involves a shared vision, with areas of responsibility to be led by team members. A hybrid approach might be rotating final decision-making authority amongst team members, who each have areas of responsibility. In any case, develop a transparent leadership structure for your team, before the project starts, with an eye toward how each member would present their leadership role to potential employers. After choosing a leadership structure, memorialize the decision in a written document.