

Michigan Technological University
CEGE Department Academy Framework
and Operations Plan
2023

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I. Introduction and Department Chair Statement

Inaugurating the first class in 1993, the Academy was created to honor outstanding graduates and distinguished friends of the Civil, Environmental, and Geospatial Engineering Department. Election to the Academy recognizes excellence and leadership in one's career as well professional and community service shaping the world. The Academy recognizes the past and current accomplishments of the CEGE graduates; the members of the Academy are poised to support the future of the CEGE Department and future alumni.

Engaging the collective experience and capabilities of members of the Academy is an opportunity that the CEGE Department must pursue in a structured and organized fashion. Academy members represent our most successful alumni, and as such the department wishes to learn from their success in addition to recognizing members for their accomplishments.

The department conducted an extensive study relative to creating a sustainable link with this expertise in 2020, and the results of that study were used as the basis for developing this initial Framework. Academy members worked with the department on Senior Capstone Project reviews during late 2020 and early 2021 provided additional insights on how an Academy support effort might be implemented.

A primary goal in developing the Framework is to evolve a more organized process around the academy. Numerous elements of the existing process have been consolidated into this document, and new information on how the department will work with the Academy are developed and presented here for the first time.

II. Purpose

The Purpose of this Framework is to better define, direct and deploy the experience and capabilities of our most successful alumni in order to better prepare the students. In developing and implementing a defined nomination process, mission, vision and ongoing operations profile for the CEGE Academy we aim to improve the student experience.

Secondarily the Framework will act as a working repository for assets developed by the Academy in support of the process. Items such as key reports, process support direction summaries established with faculty, and information gathering tools for Academy and faculty will be maintained in the Appendices to the Framework.

III. Scope

The CEGE Academy framework presents an opportunity to formally capture existing aspects of Academy operations as standard operating policy, and extend the scope to include departmental support activities that were evaluated in the 2020 study and may be identified in the future.

The two essential elements of the Academy scope are as follows:

1. Act as the primary alumni recognition venue for the CEGE Department, applying the criteria for induction in the section that follows.

2. Provide tactical and strategic support for the overall mission of the CEGE department.

The Academy Executive committee will be responsible for ensuring that all support mechanisms are examined and prioritized in line with the priorities of the department. This will be done by maintaining contact with Department leadership to ensure that department priorities are continuously reflected in our support actions.

IV. Roles and Responsibilities/Process Governance

Process Governance and coordination with the department is the responsibility of the CEGE Department Chair. Reviews of the content, application, implementation, and operation of the Academy Framework will be formally conducted and amended by CEGE Department Leadership and the CEGE Academy Executive committee every two years. Input from faculty, Academy members, and students will be sought as part of the update.

The scope of these reviews shall be agreed to by the CEGE Department Chair and the head of the Academy Executive committee. The scope of the reviews will be to:

- ❖ Assess activities, including their effectiveness and impact for the prior 2 years,
- ❖ Identify new support that may be needed/desired,
- ❖ Review the basic provisions of the framework related to membership selection, nomination, and induction, and
- ❖ Identify Framework amendments that may be needed.

Once amended, the Framework will be reviewed by faculty and Academy members, and a final version will be issued after amendments are fully agreed upon.

A. *CEGE Department Chair*

- ❖ Co-Manage the Academy in conjunction with the Academy Executive Committee
- ❖ Establish and maintain the nomination and induction criteria in conjunction with the Academy Executive Committee
- ❖ Provide primary liaison between the department and the Academy
- ❖ Attend Academy Executive Committee meetings
- ❖ Support enhanced visibility with Faculty and Students relative to Academy membership and activity initiatives
- ❖ Assist with the Development and maintenance of website presence for Academy on the CEGE Department web page

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- ❖ Promote Academy activities in the context of the unique opportunity this presents at well established 4-year Universities vs. shorter term academic competitors
- ❖ Provide oversight and leadership to the Academy to ensure that the Academy activities are in line with departmental priorities
- ❖ Identify and communicate strategic and tactical support opportunities to the Academy

B. CEGE Academy Executive Committee

See Appendix II for full detail on the CEGE Academy Executive committee structure, and work plan

- ❖ Co-Manage the Academy in conjunction with the Department Chair
- ❖ Maintain and periodically amend the Academy Framework. This will ensure that there is continuity in Academy operations at any given time
- ❖ Establish an Academy work plan that spans two year periods, and is amended along with the framework review. This will cover primary activities for the Academy for the period covered
- ❖ Establish and document solid, repeatable process maps for specific categories of support that have occurred and produced successful results. This will ensure that a uniform process occurs for items such as Senior Capstone Project reviews
- ❖ Act as the primary communications avenue between the department and Academy by establishing a regular sequence of communications to all Academy members
- ❖ Establish an annual meeting schedule (virtual) to ensure that the framework remains current, and new opportunities can be acted upon
- ❖ Maintain the Academy email list, and an ongoing summary of offers for support from Academy members
- ❖ Establish a database of Academy expertise, and abstracts for areas of support or presentations that Academy members have volunteered to support
- ❖ Maintain historical Q&A and survey support materials for use with Academy Members and Faculty
- ❖ Attend Academy induction events and provide orientation to new Academy members

C. CEGE Academy Members

- ❖ Establish an Academy profile using a preformatted form provided by the Academy Executive committee. This is done for the purposes of indicating the level of involvement each member would be willing to support, technical and business specialties, and other basic information that would allow for population of a member expertise database.

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- ❖ Support the development of the initial framework and Academy operations plan via involvement in the review process
- ❖ Support initiatives outlined in the framework, and as they develop as part of the Academy operations plan
- ❖ When fully engaged, provide specific support services as part of a coordinated effort by the Academy Executive committee or ad hoc based upon the individual situation

D. *CEGE Industry and Alumni Communication Committee Chair*

- ❖ Provide faculty representation on the Academy Executive committee
- ❖ Act as the primary interface between the Academy and students for the purpose of coordinating agreed upon support activities
- ❖ Assist with review/development of pro forma support process maps to ensure that work with students occurs in a controlled and agreed upon uniform matter
- ❖ Foster faculty familiarization with the Academy members' expertise, and offers of assistance in support of the Academy operations plan
- ❖ Identify situations where the Academy members expertise in business would enhance the learning experience
- ❖ Communicate key issues of interest to the Academy in order to assist with ongoing development of the Academy work plan
- ❖ Provide student feed back to the Academy Executive Committee

V. *Operations of the Academy*

The overall operations of the Academy would be several fold:

- ❖ Champion a greater visibility and linkage with the University for the purposes of creating a feedback loop between successful alumni and current students, particularly those in the latter years of their degree efforts
- ❖ Establish and maintain the academy framework
- ❖ Propose, Develop, and Maintain and propose changes to the Academy work plan
- ❖ Develop support tools for the process that will better enable understanding of the full capabilities of Academy members, and focused implementation of support
- ❖ Innovate new and productive efforts to provide or facilitate focused funding efforts in support of departmental priorities

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- ❖ Support on site or remote activities as outlined in our services offerings to the department

A. Mission

Support the CEGE Department by extending the Academic Experience to include access to the full capabilities surrounding Engineering Practice/ Business Experience of the Academy membership.

B. Vision

Create and maintain an effective feedback loop between the department's most successful alumni, faculty and students for the purposes of differentiating MTU from other universities. Enhance the value of a MTU degree via students being given access to the experience base of the Academy as they progress through their studies.

C. Membership Criteria

This section will be re developed by the Academy Executive committee and Department faculty. The existing criteria for nomination- engineering excellence and community service will remain intact and be expanded upon with more specific examples of the spirit and intent of the criteria for nomination.

D. Nomination and Induction

Mechanics of Process- The CEGE Academy typically inducts new members in the fall of odd number years. During the preceding year, the Department Chair calls for Academy member nominees from faculty, current Academy members, and other friends of the CEGE Department. The Industry and Alumni Contact Committee reviews and recommends nominees for induction to the Academy. Faculty review and approve the nominees at a Departmental meeting. The Department notifies the nominees of their approved nomination into the Academy and welcomes them to participate in the Academy induction.

On Boarding/Orientation of new Inductees- Once a slate of inductees is established the department head will contact one or more members of the Academy to assist with orientation of new Academy members. Orientation will generally occur during or shortly after induction, ideally on site in Houghton on the day of induction. Items to be covered will include:

- ❖ Summary of key department priorities, challenges and activities in Research, and Enterprise,
- ❖ The Academy framework, and the study that generated many of the concepts embodied in it,
- ❖ Examples of Academy activities over the past year,

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- ❖ An invitation to complete the Academy activity engagement questionnaire and participate in Academy activities

E. Departmental Support Services

With 100 living members, averaging 30 years of experience the CEGE Academy represents 3,000 years of collective experience in application of skills across CEGE and related other engineering disciplines.

Accessing the current and future Academy members experience, data insights, process mapping experience, business savvy, information on research, and information on companies and industries that students might be interested in will offer a more contemporary view of current issues in engineering practice than has been available in the past.

If properly positioned, the Academy can become a business partner of the MTU faculty by supporting access to deep industry experience, and expertise as it applies to support for engineering education and research.

The term business partner is used instead of mentoring as it implies two groups, each having their own unique and deep experience working together.

Academy members were queried in early 2020 on their interest in supporting the departments overall academic mission using a set proposed capabilities that members may be able to support. Using the results of that survey, Faculty were then questioned on the priority of activities that they felt would be of benefit.

The goal with the question sets was to develop a list of harmonized academy offerings and department priorities. Areas where Academy members might be able to support faculty/student interface, in pursuit and execution of their academic mission.

The results of the faculty input from the 2020 study are captured in the table below (lower number equals higher level of interest). This data is considered our initial baseline as respects the nature of services the Academy can provide, prioritized via discussion with Faculty. Ideally this study will be updated every two years with the goal being total alignment of Academy offerings and Department priorities.

Activity Detail	Ranking Score 1-5
Provide assistance with class projects or senior design projects (subject-matter expert).	1.4
Highlight under-developed specialty areas of the profession or areas where Civil/Environmental/Geospatial Engineers could have an increasingly influential role	1.75
Share a picture of the current trajectory and future path of various disciplines within CEE	1.83
Provide feedback on the technical components of the curriculum to enhance students future viability	1.9
Provide feedback on non-technical components (i.e., legal, financial, business operations, proposal writing, contracts, starting a business, regulatory nuance, etc.) of the curriculum to enhance students future viability	1.9

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Activity Detail	Ranking Score 1-5
Provide insights on research opportunities and organizations that may not be known to faculty or students	2.0
Identify employment sectors not currently being pursued by students	2.25
Provide insights on processes-data sets-applications that need to be improved or need to be developed in the future	2.75
Convey intellectual capital assets that may be owned by Academy members	2.8

F. Support and Identification of Capstone Projects

Support for review of Senior Capstone Project presentations was the number 1 faculty priority in our 2020 study. The process is ongoing, and significant process changes relative to Academy involvement have been communicated and implemented as reflected in **Appendix III** of the framework.

As Academy involvement matures in this area it's possible that members may be able to identify and propose projects for future consideration.

G. Student Candidate Marketing Support

The Department has identified a need for support in the area of student marketing. This activity requires commitment, training and strategic alignment with the department.

H. Enterprise Support

This area of support will be more fully vetted during 2023 with a view towards how the Academy members might support project work occurring within the Enterprise efforts of the department.

I. Linkage with Pipeline Efforts

The department is engaged in various activities directed towards creating employment opportunities for students, and if possible, aligning those opportunities with the several companies that are led by former Tech graduates. Overall, one the key elements of the Academy can be to support student transition into the engineering profession. Academy members own businesses, are generally well connected and have insights on fields of employment that students may or may not be aware of.

Appendix I- See Separate Document

Appendix II- Academy Executive Committee Structure, Operations Detail, Work plan

The primary activities of the Executive Committee will be centered on the following broad categories:

- ❖ Champion a greater visibility and linkage with the University for the purposes of creating a feedback loop between successful alumni and current students, particularly those in the latter years of their degree efforts
- ❖ Establish and maintain the academy framework
- ❖ Develop, maintain and propose changes to the Academy work plan
- ❖ Develop support tools for the process that will better enable understanding of the full capabilities of Academy members, and focused implementation of support
- ❖ Innovate new and productive ways to provide or facilitate focused funding efforts in support of departmental priorities

More Specifically the Executive Committee will be responsible for the following:

- ❖ Co-Manage the Academy in conjunction with the Department Chair
- ❖ Maintain and periodically amend the Academy Framework. This will ensure that there is continuity in Academy operations at any given time.
- ❖ Conduct continuous review of the Academy Operations plan sections E. through I. Establish an Academy work plan that spans two year periods, and is amended along with the framework review. This will then establish the primary activities for the Academy for the period covered.
- ❖ Establish and document solid, repeatable process maps for specific categories of support that have occurred and produced successful results. This will ensure that a uniform process occurs for items such as Senior Capstone Project reviews
- ❖ Act as the primary communications avenue between the department and Academy by establishing a regular sequence of communications to all Academy members
- ❖ Establish an annual meeting schedule (virtual) to ensure that the framework remains current, and new opportunities can be acted upon
- ❖ Maintain the Academy email list, and an ongoing summary of offers for support from Academy members.
- ❖ Establish a database of Academy expertise, and abstracts for areas of support or presentations that Academy members have volunteered to support.
- ❖ Maintain historical Q&A and survey support materials for use with Academy Members and Faculty

- ❖ Attend Academy induction events and provide orientation to new Academy members

Executive Committee Membership

It is Proposed that the committee consist of 3 to 4 Academy members (needed to split duties) along with a faculty liaison and the Department Chair for oversight. It is further proposed that one undergraduate and one graduate student have seats on the Executive committee. The student involvement is critical and will consist of guidance for the Executive committee and ambassadorship with the student body on behalf of the Academy.

Initial Work Plan

The initial work plan will center on a number of items listed in the bullets above, setting the foundation for our future operations. Items such as seeing the capstone process through its new method, gathering member expertise and presentation abstracts, and vetting the faculty priorities and comments for the purposes of identifying our next level of implementation.

The faculty member and department head would serve to more fully explore faculty comments from the 2020 study, and overlay them with current department priorities. The goal of this would be to establish a more focused list of items (presentations, speaker series, on site workshops, recruiting, etc....) that the Academy can be approached for.

While a face-to-face meeting sequence would be desirable it is likely that most of the Executive committee's initial work would be conducted remotely.

Appendix III- Senior Capstone Project Support Process

I. Background

All civil, environmental and geospatial engineering and construction management students participate in a major design experience in engineering during their senior year. Students enrolled in Senior Design work as teams on client-based engineering projects, using skills acquired in earlier engineering coursework. Our department's Senior Design experience prepares students for their career by asking them to solve problems under many of the constraints and considerations that engineers and construction managers encounter on the job. These considerations include economics, environmental, sustainability, constructability, ethical, social, political, health, and safety.

The general objective of the Senior Design Project is to provide an opportunity to successfully complete a major, semester-long assignment integrating a range of civil and environmental engineering disciplines and skills. This course serves as a transition from traditional teaching to professional practice by applying actual engineering principles to a real project.

More Information...

Additional information on Senior Capstone Projects within the CEGE Department can be found via the following link:

<http://www.cee.mtu.edu/SeniorDesign/>

II. Project Sponsorship

All capstone projects have a project sponsor from industry. The following excerpt is from the College of Engineering webpage, and additional details on project sponsorship can be found via the following link:

<https://www.mtu.edu/engineering/undergraduate/seniordesign/>

We connect students and industry

At Michigan Tech, our mission is to graduate innovative, world-class engineers. But we cannot do it without you. Industry partners are critical to our success. Our Senior Design program connects students and industry through open-ended, industrial projects. Students gain the skills and experience that can launch them into successful careers, while industry partners gain access to tomorrow's engineers today.

- **Students...**our bright, energetic, and objective engineers will make your project their top priority throughout their senior year.
- **Teamwork...**we aim for teams of five students and encourage multidisciplinary projects.
- **Communication...**teams get many opportunities to hone important communications skills through interaction with industry clients, team members, vendors, and Michigan Tech faculty and staff
- **Mentorship...**a faculty advisor for each team provides the right balance of instruction and coaching, enabling students to learn by doing.

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- **Resources**...students have access to state-of-the-art design and collaboration tools, dedicated fabrication facilities, labs, and design studios.
- **Timing**...projects begin in both the fall and spring terms. Teams devote two full semesters approximately one thousand student hours or more to their project

III. ABET Outcomes

Courses are designed to make a **major** contribution to the following ABET Outcomes:

1. Students' ability to work on teams.
2. Student's ability to communicate effectively.
3. Application of modern engineering tools and techniques.
4. Requires the students to plan and design a system or component.
5. Contributes to professional understanding.
6. Student's ability to integrate information from diverse sources.
7. Student's ability to interact with professionals/practitioners and public officials.
8. Incorporates the following considerations:
 - economic
 - environmental
 - sustainability
 - constructability
 - political

More Information...

Additional information on the ABET and their accreditation requirements can be found at the following link on the Tech website:

<https://www.mtu.edu/cege/undergraduate/accreditation/>

IV. Avenues for Engagement

The primary avenue for engagement is faculty members teaching Senior Capstone, and their requirements for the project. This could include but not be limited to the following attributes of potential academy participants:

- ***Project Sponsorship*** as described earlier and in the noted web links
- ***Subject Matter Expert*** vetted by the Academy Executive Committee following consultation with faculty
- ***Technical Advisory*** services vetted via the Academy Executive Committee following consultation with faculty
- ***Ongoing relationship with a faculty member*** in support of their academic and research missions
- Academy members wishing to ***audit the process*** before fully engaging on a semester long effort

V. Academy Engagement Process

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I. Project Review

- a. Faculty members wishing to participate with the Academy support for Technical Advisory or Subject Matter Expert services on capstone projects will indicate their intent to participate to the Faculty member of the Academy Executive committee. This would generally be done at the mid point of the semester prior to the project and engagement.
- b. **Where faculty members have indicated a desire for Academy involvement, the Academy Executive committee will review abstracts or similar for all desired projects, at least one month prior to the beginning of the semester.** Reviewing candidate projects prior to canvassing the Academy will give Executive committee the opportunity to suggest focused expertise, and enable the Academy members to engage on projects where they qualify as **Technical Advisors or Subject Matter Experts**.
- c. The Academy Executive Committee will review then issue the abstracts to the Academy members for review. Every effort will be made to identify the best fit candidate to support faculty's desired role for the effort.
- d. Academy members will be given a short due date to review the projects and indicate interest back to the Academy Executive Committee based upon subject matter expertise, or business applications interest.

II. Process Engagement

- a. The Academy Executive Committee will summarize the membership's interest back to the applicable professor in order to create the communications link with individual Academy members and faculty. This will be done prior to the beginning of the semester that the project will occur in.
- b. Academy members will be engaged in a role that supports the academic and administrative requirements of the process. Individual members' roles, expertise and involvement will be addressed one on one with the faculty member teaching the class.
- c. Academy members would commit to support the process in an additive way vs. providing critique type reviews. The goal is support and bringing technical and business acumen to the students.

III. Scope of Support

Likely activities that will occur include assistance with project scoping, project mentoring and advice when requested, attendance at update meetings, advice on coincident value of the project, business perspectives the project owner may be interested in, advice on final report delivery, and attendance at practice and final presentations.

Full involvement and commitment for a semester long effort might include the following activities:

1. Attendance at 4 status updates plus select key team meetings to provide feedback and answer questions,
2. Incremental and final report review,

3. Attendance at final oral presentation, and rehearsal (2 sessions)

Appendix IV- Department Chair Compendium