I. Educational Considerations - ABET Outcomes

- an ability to design a system, component, or process to meet desired needs
  - The industry sponsor serves as the student team’s ‘client’ and defines the customer needs
  - The project scope should allow for more than one approach/solution – giving students design freedom and experience evaluating alternatives and making decisions.

- an ability to function on multi-disciplinary teams
  - A ‘typical’ student team is around five engineering seniors for Senior Design; Enterprise team sizes can be larger/smaller and consist of sophomores, juniors, and seniors.
  - In Senior Design, student teams can be formed across the appropriate engineering disciplines based on the project scope.
  - In Enterprise, existing teams are generally multi-disciplinary by default, and may also include disciplines outside engineering.
  - In both cases, students gain experience working in teams – taking on different roles, breaking down the project by technical areas, recognizing different viewpoints, etc.

- an ability to identify, formulate, and solve engineering problems
  - This is the essence of industry sponsored projects. Based on the project scope and objectives supplied by the sponsor, the student teams are challenged with translating these needs into functional requirements of the product, process, material, system, etc.
  - Teams draw on their engineering education to connect theory and application. Project management tools are critical to their success.
  - Teams also draw on the technical expertise of their sponsor, MTU faculty advisor, and MTU technical staff where appropriate.

- an understanding of professional and ethical responsibility
  - Professional and ethical responsibility are mainly covered topically in lecture/course modules, often with individual assignments given to students.
  - Professional responsibility is part of the project experience – teams have a customer, a real problem to solve, and a budget and timeline to manage.
  - Ethical issues may be part of the project experience (intellectual property, safety, conflict of interest, etc.).

- an ability to communicate effectively
• This is a key educational objective of industry-sponsored projects. Student teams get several opportunities to hone communication skills through interaction with the project sponsor, fellow team members, MTU faculty and staff, and vendors.
• Teams will have access to different communication tools: email, video/teleconferencing, face to face meetings, project plans and progress reports, etc.

- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

• Michigan Tech Senior Design and Enterprise teams are provided access to state-of-the-art design tools, fabrication, test, and analytical facilities on campus. The available infrastructure provides for a wide variety of projects to be undertaken.
• Specialized resources (testing, software, materials, etc.) that are unique to the sponsor should be discussed up-front.

II. Sponsor Considerations and Responsibilities

Project Scope:
• Consider a scope that is suitable for entry-level employees in the sponsor’s organization.
• Identify a problem that possesses an open-ended design solution – giving students the opportunity to explore and evaluate multiple approaches.
• Identify the core and supporting disciplines that are needed for the project; this will be a key consideration in the formation of the team.
• The project should be scoped such that it can be completed on-campus by the team during the academic year;
  • Typical Senior Design teams involve approximately 1000 student hours worth of engineering effort (@ 5 students).
  • Enterprise projects can be consistent with above, with additional flexibility to consider larger, multi-semester projects, as well as smaller projects (Enterprises operate as permanent organizations or ‘virtual businesses’).
• Ideal projects are those where the sponsor does not have a pressing need for results.

Sponsor Involvement:
• Identify a project contact/liaison who will be accessible to the team during the duration of the project – this is a critical success factor on sponsored projects.
• Typical involvement is on a weekly basis – perhaps 1-2 hours per week. The sponsor contact is a client as well as professional resource/mentor for the team.
• Opportunities to meet face-to-face are encouraged as this enhances the experience for students and the project sponsor.
• The sponsor may need to supply specialized resources that are cost or time prohibitive for the team and Michigan Tech to acquire – samples, test facilities, equipment, software, etc.

Expectations/Deliverables:
• Educational deliverables of the program include: a preliminary design report and review with the sponsor, a final design report and presentation to the sponsor, and creation of a project poster for participation in MTU’s annual Undergraduate Expo.
• Most projects will also deliver a functional prototype of some sort – which may include hardware and/or software – and dependent upon the project scope.
• Due to the educational nature of these programs, MTU can make no explicit guarantees of success or results beyond the educational deliverables.

**Project Budget:**
• A portion of the sponsorship funding is provided to each team as a project budget to cover travel, hardware, materials, and outside vendor purchases. Note that teams will have extensive design tools, fabrication facilities, analytical, and testing resources available for use within the college and the respective departments.
• Project budgets beyond the standard amount should be discussed in advance between MTU faculty/staff and the sponsor; the project scope can either be modified to meet the standard budget, or the sponsor can agree to provide the incremental funding required to complete the project.

**Intellectual Property, Confidentiality, and Funding Considerations**
• See separate document provided; *Considerations for student design project funding routes(rev1).pdf*