Mechanical Engineering - Enterprise Enrollment Guidelines (Undergraduate) – February 2016

Enterprise project work (ENT3950/3960/4950/4960) and other Enterprise Concentration requirements (HU3120 and Enterprise Modules) are required for students completing the BSME-Enterprise Concentration as shown on the **BSME-Enterprise Concentration flowchart**. Students may enroll in Enterprise project work (e.g., ENT2950) and participate on an Enterprise team prior to declaring the Enterprise Concentration. If the student decides not to complete the Enterprise Concentration, any Enterprise project credits can be applied to free electives for the standard BSME. HU3120 can be used as 3 credits of General Education for HASS Communication/Composition or HASS Humanities/Fine Arts or HASS-Any provided these requirements have not already been met. If the student chooses to complete the Enterprise Concentration, he/she must complete and sign a Curriculum Add/Drop form with an ME academic advisor to add the Enterprise Concentration. This should be done prior to enrolling in ENT4950.

Suggested Enterprise teams for mechanical engineering undergraduate students are shown below. It is possible for an ME student to participate on other Enterprise teams provided the student's planned project work for ENT4950 and ENT4960 meets the capstone requirements dictated by the ME-EM department to satisfy ABET accreditation requirements. For all teams the capstone project must be defined for ENT4950 and 4960 (a full two-semester project) prior to registration in ENT4950.

The minimum Enterprise team participation for ME students completing the BSME-Enterprise Concentration is four project semesters (ENT3950/3960/4950/4960) with the same Enterprise team. Three one-credit Enterprise modules are also required. HU3120 is required and can be double-counted as General Education HASS Communication/Composition or HASS Humanities/Fine Arts or HASS-Any provided these requirements have not already been met. Refer to the **BSME-Enterprise Concentration flowchart notes (reverse/page 2 of flowchart)** for more details. All required forms and templates are shown in the appendix of this document and are available on the wall outside the ME Advising Center (204/205 MEEM) and at *http://www.mtu.edu/mechanical/undergraduate/advising/*

ME-EM faculty advised or ME-focused Enterprises (Projects always available that meet ME Enterprise capstone criteria)

Advanced Metalworks (AME, L01) – Advisor: Dr. Paul Sanders, M&M 603, sanders@mtu.edu
http://www.michigantechame.com/
Component design/modeling, fabrication (machining, casting, wrought processing), and performance characterization (microstructure, mechanical properties). Primarily working on industry-sponsored projects related to machining, casting, and wrought processing of metals and metallic components. Fabrication of patterns for sand molding, permanent molds, dies for die-casting, and specialized testing equipment for our sponsors and other enterprises on campus.
Registration: Students must apply at http://michigantechame.com/get-involved and email completed application to Dr. Sanders (sanders@mtu.edu) for Enterprise advisor approval. See instructions on page 6 for ENT4950.

Aerospace (L21) – Advisor: Dr. Brad King, MEEM 1014, lbking@mtu.edu
http://www.aerospace.mtu.edu/
Invent and build spacecraft and gliders with an emphasis on systems engineering in the areas of avionics, propulsion, rocket design, and aerodynamics. Combination of competition and industry-sponsored projects.
Registration: Student may register for appropriate section without instructor/Enterprise advisor approval. Exceptions are ENT1960, ENT3980, ENT4950/60 and ENT4961 which require instructor approval. See instructions on page 6 for ENT4950.

Baja SAE (Blizzard Baja, L06) – Advisor: Kevin Johnson, MEEM 704, kevinj@mtu.edu
http://www.enterprise.mtu.edu/ams/
Design and fabricate an off-road vehicle for competition with a focus on frame, chassis, and suspension improvements. Competition based on performance, manufacturability, cost, and ergonomics.
Registration: To join the Enterprise for the first time, submit a resume and a personal statement (why you want to join Baja and description of your intended contribution to the team) to the Enterprise advisor. If approved by the Enterprise Executive Board, contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

Blue Marble Security (BMS, L02) – Advisor: Dr. Glen Archer, EERC 629, gearcher@mtu.edu
Working to develop security solutions for people in their homes, for local governments to protect their communities, for industries to protect their workers and their infrastructure, and for international markets. Additionally, developing initiatives in counter-surveillance, imaging solutions, environmental monitoring, and industrial process control.
Registration: Instructor (Enterprise advisor) approval. Submit a signed Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register for each project semester course (except ENT4950, see instructions on page 6).

Board Sport Technologies (BST, L11) – Advisor: Dr. Ibrahim Miskioglu, MEEM 821, imiski@mtu.edu
http://www.enterprise.mtu.edu/boardsports/
Invent innovative boarding designs, materials, and processes in the construction of boards and associated structures/products for a variety of board sports such as snowboarding, wakeboarding, and skateboarding. Work on industry-sponsored innovation projects. Also design terrain park obstacles and grooming equipment for board sports.
Registration: To join the Enterprise each semester, see an ME academic advisor during open registration periods. The academic advisor will check academic standing and register students for each project semester course (except ENT4950, see instructions on page 6). Instructor (Enterprise advisor) approval is required for ENT1960, ENT3980 and ENT4961. Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

SAE Clean Snowmobile Challenge (CSC, L07) – Advisor: Dr. Jason Blough, MEEM 1020A, jrblough@mtu.edu
http://csc.enterprise.mtu.edu/
Design and modify a snowmobile to achieve reduction in emissions and noise levels while maintaining high performance and fuel efficiency. Compete in both reduced and zero emission (all-electric) divisions.
Registration: To join the Enterprise for the first time, submit a resume and a personal statement (why you want to join CSC and description of your intended contribution to the team) to the Enterprise advisor. If approved by the Enterprise Executive Board, contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

Consumer Product Manufacturing (CPM, L08) – Co-advisor: Dr. Tony Rogers, Chem Sci 305C, tnrogers@mtu.edu; Co-advisor: Dr. Sean Clancey, Chem Sci 202E, msclance@mtu.edu
http://cpmenterprise.mtu.edu/
CPM aims to empower students with the entrepreneurial, technical, and professional skills to conceive, develop, and market successful products in a company setting. The team's most recent projects include optimizing manufacturing processes, developing improved drying methods for commercial part washers, optimizing and designing a sustainable aquaponics system, improving watershed models to provide advanced flood warning, integrating high-tech materials into athletic equipment, tailoring biochar production to meet the needs of developing countries, and working with a commercial partner to produce charcoal fuel for cook stoves in West Africa.
Registration: Contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT 4950, see instructions on page 6).

Formula SAE Racing Team (FSAE, L05) – Advisor: Dr. Jim DeClerck, MEEM 927, jdeclerck@mtu.edu
https://sites.google.com/site/michigantechracing/
Design and build an Indy-style race car for competition with a focus on optimization of chassis, frame, wheel, and engine design. Competition includes both racing performance and design components.
Registration: To join the enterprise for the first time, submit a resume and a personal statement (why you want to join FSAE and description of your intended contribution to the team) to the Enterprise advisor. If approved by the Enterprise Executive Board, contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

Hybrid Electric Vehicle (HEV, L04) – Co-advisor: Mr. Bob Page, MEEM 604A, rwpage@mtu.edu; Co-advisor: Mr. John Lukowski, EERC 233, jtlukows@mtu.edu
http://hev.enterprise.mtu.edu/
HEV Enterprise is a multidisciplinary team that will design and build an advanced technology hybrid electric vehicle. The design objective is to modify a production powertrain to achieve over 60 mpg fuel economy while preserving vehicle functionality, safety, and performance. Program involves modification of a vintage 1949 Chevrolet pickup with a custom tubular chassis and focuses on maintaining vehicle performance while achieving environmental impact goals. Vehicle performance will be demonstrated to a select group of industry professionals in a "Chief Engineer's Challenge".
Registration: To join the Enterprise for the first time, submit a resume and a personal statement (why you want to join HEV and description of your intended contribution to the team) to the Enterprise advisor. If accepted, contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT 4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

Innovative Global Solutions (IGS, L16) – Co-advisor: Dr. Michele Miller, MEEM 904, mhmiller@mtu.edu; Co-advisor: Dr. Robert Warrington, M&M 722, row@mtu.edu
http://igs.enterprise.mtu.edu
IGS offers a unique opportunity for students to design and build systems and products for developing countries in need of them. Through working with other organizations on campus including the Pavlis Institute, the Peace Corps program, and International Senior Design, they will implement or introduce these solutions in targeted developing countries.
Registration: Contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6).

Mining INnovation and Engineering (MINE, L32) – Advisor: Dr. Paul van Susante, MEEM 817, pjvansus@mtu.edu;
In MINE the objective is to design, test, and implement mining innovation technology for industry partners. Some of these aspects include the improvement of safety and working conditions and increased productivity and efficiency as well as equipment design and optimization.
Registration: Contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6).

Strategic Education through Naval Systems Experiences (SENSE, L09) – Advisors: Dr. Andrew Barnard, MEEM 930, drb@mtu.edu & Dr. Nina Mahmoudian, MEEM 1009, ninam@mtu.edu
http://sense.enterprise.mtu.edu/
SENSE's mission is to enable the workforce of tomorrow to redefine the boundaries for air, land, sea, and cyber supremacy through experiential learning and discovery. Students will design, build, and test engineering systems with a focus on Navy applications in all domains: space, air, land, sea, and undersea. Get hands-on experiences with cutting-edge defense technologies that directly impact the safety and success of our armed forces. Prepare for civilian employment opportunities in Department of Defense research labs or with DoD contractors.
Registration: To join the Enterprise for the first time, submit a resume and a personal statement (why you want to join SENSE and description of your intended contribution to the team) to the Enterprise advisor. If approved by the Enterprise Executive Board, contact the instructor to sign the Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register. This signed form is required for each project semester course (except ENT4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

SAE Supermileage Systems (SSE, L13) – Advisor: Mr. Rick Berkey, M&M 722, rjberkey@mtu.edu
http://www.enterprise.mtu.edu/SSE/
Development and construction of innovative, single-passenger, and extremely energy-efficient vehicles for the SAE Supermileage and Shell Ecomarathon Americas competitions. Supermileage is a multidisciplinary student-led organization where team members gain valuable experience in leadership, teamwork, communication, project management, and vehicle development including: body/chassis, powertrain, and electrical/controls. The Supermileage competition focuses on optimization of a four-cycle internal combustion engine whereas Shell Ecomarathon provides students experience in battery electric vehicle (BEV) development.
Registration: To join the Enterprise each semester, see an ME academic advisor during open registration periods. The academic advisor will check academic standing and register students for each project semester course (except ENT4950, see instructions on page 6). Instructor (Enterprise advisor) approval is required for ENT1960, ENT3980 and ENT4961. Student must be in good academic standing (i.e. not on academic probation) to be registered for project credit on this team.

Velovations (L31) –Advisor: Mr. Steve Lehmann, MEEM 608, sdlehman@mtu.edu
http://www.enterprise.mtu.edu/velovations/
Collaborating with the bicycle industry working on sponsored projects to develop new products and processes. Focus on product development from customer need, through product/process design and testing, manufacturing, supply chain management, marketing, and distribution.
Registration: Instructor (Enterprise advisor) approval. Submit a signed Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval form to register for each project semester course (except ENT4950, see instructions on page 6). Student must be in good academic standing (i.e., not on academic probation) to be registered for project credit on this team.

Add'l Enterprise teams (Abbreviation, Home Department) – Verify that ME project work is/will be available

- Alternative Energy Enterprise (AEE, Chemical Engineering, L23)
- Efficiency Through Engineering and Construction (ETEC, School of Technology, L14)
- General and Expedition Adventure Research (GEAR, Engineering Fundamentals, L34)
- Green Campus (Civil & Environmental Engineering, L30)
- Humane Design Interface Enterprise (HIDE, Computer Science, L19)
- Open Source Hardware (Materials Science and Engineering, L33)
- Robotic Systems (RSE, Electrical & Computer Engineering, L15)
- Wireless Communications (WCE, Electrical & Computer Engineering, L03)

Other Enterprise teams may have acceptable capstone project work for ME students, but students must verify this prior to starting ENT3950 with the Enterprise advisor. Consultation with the ME-EM department for evaluation of possible capstone (ENT4950/4960) projects is highly recommended before adding ENT3950.

Team web pages available through http://www.mtu.edu/enterprise/

Declaring the Enterprise Concentration

Students must declare the BSME-Enterprise Concentration (EMEE) with an ME academic advisor using the Curriculum Add/Drop form. This will ensure that the BSME-Enterprise Concentration degree audit is used to verify graduation requirements. The form will be filed with the Registrar (scanned document via email) and the concentration will be added to the student's curricula. A scan of the form will be saved by the ME Advising Center and a copy will be emailed to the student. Declaration of the concentration is appropriate when the student has completed one or more project semesters with an Enterprise team, intends to complete the concentration requirements, and before enrollment in ENT4950.

Project Credit Courses

Getting Started

- **ENT 1960** – Project work (first semester of team-specific Enterprise participation) – 1 credit. Intended for second semester of the first year. Only applies to the BSME degree as a free elective. Student may be required to meet team-specific criteria prior to enrollment.

Project semesters not required for BSME Enterprise concentration (> 4-semester minimum commitment to team)

- **ENT 2950** – Project work – 1 credit. Intended for first semester of the second year and/or when a student has six semesters remaining until graduation (when enrolled in Mechanical Engineering Practice I, MEEM2901). May be used as an Enterprise module. Student may be required to meet team-specific criteria prior to enrollment.
- **ENT 2960** – Project work – 1 credit. Intended for second semester of the second year and/or when a student has five semesters remaining until graduation (when enrolled in Mechanical Engineering Practice II, MEEM2911). May be used as an Enterprise module. Student may be required to meet team-specific criteria prior to enrollment.
- **ENT 3980** – Project work – 1 credit. Pre-capstone project semester. Intended for students that have completed ENT3950 and ENT3960 with the same Enterprise team, but lack the required pre-reqs to enroll in ENT 4950. May be used as an Enterprise module. Student may be required to meet team-specific criteria prior to enrollment.
- **ENT 4961** – Project work – 1 credit. Post-capstone project semester. Intended for students that have completed ENT 4950 and ENT 4960. May be used as an Enterprise module. Student may be required to meet team-specific criteria prior to enrollment.

Project semesters required for the BSME-Enterprise Concentration (**all 4 must be with the same Enterprise team**)

- **ENT 3950** – Project work – 1 credit. Intended for first semester of the third year and/or when a student has four semesters remaining until graduation (when enrolled in Mechanical Engineering Practice III, MEEM3901). Student may be required to meet team-specific criteria prior to enrollment.
- **ENT 3960** – Project work – 1 credit. Intended for second semester of third year and/or with three semesters remaining until graduation (when enrolled in Mechanical Engineering Practice IV, MEEM3911). Students should also be set up for other capstone design readiness pre-reqs required for ENT4950 (see below and flow chart). Student may be required to meet team-specific criteria prior to enrollment.
- **ENT 4950** – Capstone Project work – 2 credits. **The following are required *prior* to be registered in ENT 4950.**
    1. **Satisfy pre-requisite requirements:**
        - **2013 or earlier flowchart: MEEM3900, MEEM3000 (concurrent pre-requisite), MEEM3502 (concurrent pre-requisite), and ENT3950/ENT3960 in same Enterprise.**
        - **2014 or later flowchart: MA3710, MEEM3201 (concurrent pre-requisite), MEEM3750 (concurrent pre-requisite), MEEM3911, and ENT3950/ENT3960 in same Enterprise.**
    2. **Fully approved Verification of Senior Design Objectives through Enterprise Experience form (see form and detailed instructions in appendix).**

  Student may also be required to meet team-specific criteria prior to enrollment.
- **ENT 4960** – Capstone Project work – 2 credits. The above ENT4950 project submission will also define this course content as the second capstone project semester, although separate Enterprise advisor approval may be required for ENT4960 registration. Student may be required to meet team-specific criteria prior to enrollment. Same ENT4950 pre-reqs apply to ENT4960 also.

NOTES:

- **The four required project semesters on the same enterprise team are not necessarily required to be completed in consecutive semesters.** Any semesters of non-participation due to co-op, study abroad, etc. should be coordinated by the student with the Enterprise advisor.
- Amended Verification of Senior Design Objectives through Enterprise Experience forms should be prepared and submitted to the ME Advising Center as appropriate if significant changes to the approved scope or deliverables of the project are made during either senior design project semester. These changes will also require ME-EM department review and approval. The final Verification of Senior Design Objectives through Enterprise Experience form on file at the conclusion of the senior design project semesters must represent the project and deliverables as completed by the student.
- All Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval forms required for registration into a given project semester must be fully and accurately completed by the student (M number, name, course number, CRN and lab section number for specific team section for requested semester, Enterprise name, and semester) before submission to the ME Advising Center for registration. An Enterprise advisor may send an ME academic advisor an email to approve enrollment in place of the signed enrollment form as long as the appropriate student and section information is included. Certain Enterprises may require good academic standing for enrollment, as noted above. Academic advisors will confirm academic standing before registration in project semester courses where necessary.

Enterprise Modules

- 1-2 credits each (mostly 1 credit each)
- 3 total credits required
- Specific modules may be restricted by class standing, may require instructor approval for registration, may have pre-requisites, and/or may be offered in only one semester per academic year. Please see BanWeb for course descriptions and any restrictions.
- See notes on BSME-Enterprise Concentration flowcharts for approved modules for ME majors.
- Up to 2 credits total of UN3002 or UN3003 (co-op credits) may be used as Enterprise modules for ME majors.

Required General Education (specific to Enterprise Concentration)

- HU3120 is required and can be double-listed for 3 credits of General Education for HASS Communication/Composition or HASS Humanities/Fine or HASS-Any provided these requirements have not already been met.

This set of guidelines should answer many student questions regarding participation in the Enterprise program and incorporating that participation into the BSME curriculum. Students must take responsibility for being proactive and having a good understanding of their current status, progress, and overall academic plan towards graduation. The ME academic advisors are available for assistance.

Ryan Towles
Academic Advisor
Mechanical Engineering - Engineering Mechanics
204A (203) R.L. Smith Building (MEEM)
ratowles@mtu.edu
906.487.2564

APPENDIX

enterprise program

Michigan Tech

ENT4950 Registration Permission Form

Verification of Senior Design Objectives through Enterprise Experience

Major: MECHANICAL ENGINEERING **Date:** _____

Instructions for completion and submission of this form on the next page.

Part A: To be completed by student.
Identify semester/year/CRN for appropriate section of ENT4950:

Student: _____
ID#: M_____
Primary major: _____ 2nd major/deg: _____

Course:	Semester/Year:	CRN:
ENT4950	_____	_____
ENT 4960	_____	_____

e-mail: _____@mtu.edu

Enterprise :_____
Enterprise Advisor:_____

Check if applicable:
☒ ENT concentration (EMEE Declared ☐) ☐ Enterprise Minor

Part B. To be completed by student and enterprise advisor. Form must be approved by your academic department prior to enrolling in ENT4950.

☐ Senior Design Ready: _____ (to be initialed by academic advisor)

___ ENT 3950 (same team) ___ MEEM 3900 ___ MEEM 3502 (C)
___ ENT 3960 (same team) ___ MEEM 3000 (C)

OR

___ MEEM 3911 ___ MEEM 3201(C)
___ MA 3710 ___ MEEM 3750 (C)

Project Title:_____

Abstract: Outline the project scope and deliverables assigned **to this student** (attach additional pages as needed).
~~☐ Preliminary Project Abstract~~ ☒ Final Project Abstract

SEE ATTACHED (ME PROJECT BRIEF TEMPLATE)

Good Academic Standing required for enrollment in Formula SAE, Clean Snowmobile Challenge, Boardsport Technologies, Baja SAE, SENSE, Supermileage Systems, HEV, Velovations, Aerospace.
Student in Good Academic Standing: YES NO N/A

ABET Criteria Enterprise Advisor should check whether student will:

☐ 3 (a) Apply knowledge of mathematics, science and engineering.
☐ 3 (b) Design and conduct experiments, as well as to analyze and interpret data.
☐ 3 (c) Design a system, component, or process to meet desired needs.
☐ 3 (d) Function on multi-disciplinary team(s) as demonstrated by the execution of a team project that is too large, complex, or diverse for a single person. Partition a project into tasks and lay out a project plan. Execute the project and produce the required deliverables.
☐ 3 (e) Identify, formulate and solve engineering problems.
☐ 3 (f) Demonstrate understanding of professional and ethical responsibility.
☐ 3 (g) Communicate effectively.
☐ 3 (h) Gain understanding of the impact of engineering solutions in a global, economic, environmental and societal context.
☐ 3 (i) Recognize the need for, and an ability to engage in life-long learning.
☐ 3 (j) Gain knowledge of contemporary issues.
☐ 3 (k) Use the techniques, skills and modern engineering tools necessary for the practice of engineering.
☐ Program specific criteria (please describe on back of this form)

Approved by: _____
Enterprise Faculty Advisor Date

Approved by: _____
Academic Department Date

Approved by: _____
2nd Major/Deg Academic Department Date

Return completed from to Enterprise Program Office, IIS, 722 M&M.

Enterprise Design Verification, Rev 4
Feb -12

Mechanical Engineering – Verification of Senior Design Objectives through Enterprise Experience
(ENT 4950 Registration Permission Form)

The Verification of Senior Design Objectives through Enterprise Experience form must be completed by each BSME-Enterprise concentration (EMEE) student prior to registering for ENT4950. The form is not complete until approved by the ME-EM department. The purpose is to ensure that the student's participation in the Enterprise program represents a culminating design experience as required by ABET (equivalent to ME-EM Senior Capstone Design). The basic procedure to be followed by ME students is provided below.

Students should consult with their Enterprise team advisor when defining the capstone-equivalent project they will be participating in. The completed form must be approved by the Enterprise team advisor and the ME-EM Associate Chair for Undergraduate Studies. After the Enterprise team advisor has signed the form, the student must submit the form to the ME Advising Center (2nd floor MEEM) for verification of pre-requisites by an academic advisor. The advisor will then submit the form to the ME-EM Associate Chair for Undergraduate Studies for review. The student will be enrolled in ENT 4950 when the form is returned with the Associate Chair's approval. Dual degree students need departmental approval from both applicable departments. Department approval must come from student's major department, not department housing the enterprise team.

The following steps are required prior to enrollment in ENT4950.

1. **Complete Verification of Senior Design Objectives through Enterprise Experience form.**
2. **The form must show the applicable ABET criteria addressed by the project (checked off by the Enterprise advisor).**
3. **To be approved, the form must have an attached abstract/project brief that follows the required template for ME students. The project defined in this document should encompass both semesters of the project (ENT 4950 and 4960). Students working on the same project may submit the same project brief but must submit an individual form with brief attached.**
4. **Form must be signed by the Enterprise advisor prior to submission to an academic advisor.**
5. **The academic advisor will verify the following senior design readiness pre-requisite requirements are satisfied. The student should not check these off.**
   - **2013 or earlier flowchart: MEEM3900, MEEM3000 (concurrent pre-requisite), MEEM3502 (concurrent pre-requisite), and ENT3950/ENT3960 in same Enterprise.**
   - **2014 or later flowchart: MA3710, MEEM3201 (concurrent pre-requisite), MEEM3750 (concurrent pre-requisite), MEEM3911, and ENT3950/ENT3960 in same Enterprise.**
     The above are the same pre-reqs required for MEEM4901.
   - **At least two semesters of project credit are required for ENT4950 readiness. These prior semesters must be on the same Enterprise team as planned for ENT4950/4960. Typically these are ENT3950 and ENT3960 (4 total semesters minimum on the same Enterprise team including the capstone project semesters).**
6. **The academic advisor will forward the completed form to the Associate Chair for final approval.**
7. **When the department-approved form is received back, an academic advisor will enroll the student in ENT4950 and notify the student via email. Students will not be enrolled in ENT4950 prior to the completion of this process.**

The approved form and brief will be retained on file in the ME Advising Center and will also be submitted electronically to the Enterprise program office. It is recommended that this form be completed during the semester prior to taking ENT4950 in order to facilitate the registration process. The latest the form should be submitted is the end of the first week of classes of the semester in which ENT4950 is to be completed.

All that is typically required for ENT4960 registration for the second semester of the capstone-equivalent project is the usual signed Enterprise Enrollment (instructor) Approval form or equivalent. However if there any significant changes to the project definition, or if the original submission did not cover the second semester of the project, the above department approval process will be required for ENT4960 as well. Same ENT4950 pre-reqs apply to ENT4960 also.

Recognizing that it may not be possible to accurately and precisely predict the design project progress/outcome in this timeframe (i.e., the design project scope and/or deliverables may change over the course of the two project semesters), amended Verification of Senior Design Objectives through Enterprise Experience forms must be prepared and submitted through the above process again, if necessary. The final form on file at the conclusion of the Enterprise project course sequence must represent the project and deliverables as completed by the student.

Questions can be directed to Ryan in the ME Advising Center (204/205 MEEM, inside the ELC).

2.9.2016

Abstract Template for Verification of Senior Design Objectives through Enterprise Experience Form

- This format must be followed for ME students submitting the above project form for approval, regardless of Enterprise team.
- This template is available for download at: http://www.mtu.edu/mechanical/undergraduate/advising/docs/ent4950-abstract-template.docx

Topic

Project Topic Here

Objective:

One sentence project objective

Background

concise background of problem domain …

What is driving the need…?
Include photo

Project Scope

basic project scope here, maybe bullets of goals, specifics, etc.

rough definition of design space…

desired skill sets on team – curricula involved, grad student support needed?..

describe focus of team

Project Goals

- bullet 1 with sub-bullets:
  - desired outcome
  - design for X
  - performance goals
  - etc…
- some analysis deliverables along with design prototype, etc….
- goal 3
- goal 4
- etc……
-

Sponsor Can Provide:

- any special information, background, hardware, specialized testing eqpmt. etc.
- anything in existence that may support project goals
- bullet 2
- bullet 3
- etc….

Timing

Project Start: Thursday of Week 1 (Semester I)
Project Completion: Finals of Week (Semester II)

Preliminary project milestones for *ENT4950*	
Week 1	Begin semester
Week 2	Initial contact with advisor and sponsor
Week 6	Draft project plan complete
Week 7	Project plan approved
Week 11	Mid-semester design review, concepts review
Week 12	Concept selection complete
Exam week	Panel Review

Preliminary project milestones for *ENT4960*	
Week 1 - Monday	Begin semester
Week 4	Alpha proto near completion, begin evaluation
Week 8	Alpha proto complete, some testing and revision
Week 14	Final documentation and presentation

ME Enterprise Enrollment Form for Enterprise Team Project Semester Registration

- Fill out completely with M number, course number, CRN and lab section number, Enterprise name, semester, and Enterprise advisor signature.
- May be replaced with an email from the Enterprise faculty advisor that includes information all the information on the form.
- Academic advisors will confirm academic standing before registration in project semester courses, when required.

Michigan Tech Mechanical Engineering Undergraduate Enterprise Enrollment (Enterprise Advisor) Approval

Personal Information

M Number		**Name (please print)**	

Course Information

Semester / Year		**Course Number (ENT XXXX)**	
CRN # (5-digit)		**Section Number (LXX)**	
Enterprise Name			

Reference ME Enterprise Enrollment Guidelines for correct course number to be enrolled.

Good Academic Standing required for enrollment in Formula SAE, Clean Snowmobile Challenge, BoardSport Technologies, Baja SAE, SENSE, Supermileage Systems, HEV, Velovations, Aerospace.

_____ _____

Enterprise Advisor Approval Signature **Date**

Return this form to the ME Advising Center by Friday of 1st week (late-add form required after this date). Academic Advisors will enroll the above student with this signed approval form.

Student in Good Academic Standing: YES NO N/A _____ (Initials, Academic Advisor)

Curriculum Add/Drop Form

- Used to declare the Enterprise Concentration within the BSME curriculum (form is available from an academic advisor)

Michigan Tech

Degree Services
Registrar's Office
487-2395

Undergraduate Curriculum Add/Drop Form

Curriculum changes must be submitted to the Registrar's Office before Wednesday of the second week of instruction to be effective for that semester. Curriculum changes received after that time will be effective for the following semester. Changes to catalog year only will be effective for the current semester.

Current Information:

Name:	ID:
Primary Major:	Concentration:
Minor:	
Double Major:	Concentration:
Second Degree with Major/Concentration:	Catalog Term:

Change Catalog Year Only:

New catalog year to use: The catalog selected must be within seven years prior to the student's graduation or the first term the student was enrolled as a degree-seeking student at a regionally accredited institution, whichever is shortest.

❑ 2010-11 ❑ 2011-12 ❑ 2012-13 ❑ 2013-14 ❑ 2014-15 ❑ 2015-16 ❑ 2016-17

For the current: ❑ Primary Major ❑ Minor ❑ Double Major ❑ Second Degree

Additions or Changes to Current Information:

❑ **ADD** ❑ **CHANGE**

❑ Primary Major _____ ❑ Concentration _____ *(within primary curriculum)*

❑ Double Major* _____ ❑ Concentration _____ *(within double major)*

❑ Second Degree* with Major/Concentration: _____ ❑ Minor _____

*Note: A double major is not the same as a second degree. If you wish to pursue a second degree, you must complete a degree audit with the academic advisor in the second degree department.

Catalog term to use for new curriculum: The catalog selected must be within seven years prior to the student's graduation or the first term the student was enrolled as a degree-seeking student at a regionally accredited institution, whichever is shortest.

❑ 2010-11 ❑ 2011-12 ❑ 2012-13 ❑ 2013-14 ❑ 2014-15 ❑ 2015-16 ❑ 2016-17

Drop a Curriculum Program

❑ Primary Major _____ ❑ Primary Concentration _____

❑ Double Major* _____ ❑ Concentration _____

❑ Minor _____ ❑ Second Degree* with Major/Concentration: _____

Signatures Required: *(Advisor signature is **not** required for dropped curriculum)*

Student Signature Date Advisor Signature Date

Updated: 6/8/16