THE ENTERPRISE PROGRAM

MichiganTech

OPERATIONS MANUAL: *POLICIES, PROCEDURES, AND RESOURCES*

http://www.enterprise.mtu.edu/

The *Enterprise Program Operations Manual* has several purposes: to help guide Enterprise Team advisors, team management, team members, and home departments in developing and sustaining productive and successful Enterprises; to document university procedures and policies as they relate to Enterprise functions; to provide current Enterprise Program policies for financial management and team-management procedures; and to serve as a reference for questions and problems as they arise in the day-to-day operations of your Enterprise Team.

Mary Raber, Enterprise Program Industrial Project Manager
Michael Moore, Editor

Enterprise Industry Partners

Enterprise Partner: Guidant

Enterprise Team: Wireless Communication

Enterprise Partner: TACOM (Tank Automotive and Armaments Command)

Enterprise Team: Alternative Fuels Group

Enterprise Partner: Rockwell Collins
Enterprise Team: Wireless Communication

Enterprise Partner: AASC
Enterprise Team: Aerospace

Enterprise Partner: National Science Foundation
Enterprise Team: Wireless Communication

Enterprise Partner: FINET
Enterprise Team: Wireless Communication

Enterprise Partner: SBC
Enterprise Team: Wireless Communication

Enterprise Partner: U.S Air Force Office of Scientific Research
Enterprise Team: Aerospace

Enterprise Partner: U.S Air Force Office Research Laboratory

Enterprise Team: Aerospace

Enterprise Partner: AIAA
Enterprise Team: Aerospace

Enterprise Partner: NASA
Enterprise Team: Aerospace

Enterprise Partner: Bosch
Enterprise Team: ASE

Enterprise Partner: Keweenaw Bay Indian Community
Enterprise Team: Aqua Terra Tech

Enterprise Partner: Kimberly Clark
Enterprise Team: Consumer Product Manufacturing

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Program Overview

The Enterprise Program is an extensive multi-year, multi-disciplinary design experience originally funded by the National Science Foundation through their Action Agenda Program to support Michigan Tech in developing new and innovative curricula. The Program – via its Industrial Project Manager and Governing Board – establishes a number of businesses and professional entities, and student team members choose to join one of the Enterprise Teams and work with other students and faculty to make the Enterprise a successful venture. Each Enterprise operates much like a real company in the private sector: student team members solve real-world problems, perform testing and analyses, make recommendations, build prototypes, manufacture parts, stay within budgets (real and imaginary), and manage multiple projects.

> "Students working on projects of this scale no longer feel like students. They feel like engineers. They take ownership of the project and that's the magic.
>
> Now they own their education, and that's the first step towards being a professional."
>
> Dr. Carl L. Anderson, Faculty Advisor

Now in the Program's sixth year, various approaches, team-management structures, and forms of faculty-advisor and student team-member interactions have emerged: some are the result of research and experience in industrial and organizational contexts; some are the result of industry sponsors' initiatives; and some are "just in time" inventions of our faculty advisors and team members, which grow out of the necessities of exciting, challenging, real-world team development.

The Enterprise Program is receiving national attention because of these efforts and initiatives. In addition to the unique integration of design, manufacturing, ethics, and financial curricula into a multi-year design experience such as ours, student team members have the opportunity to learn and to develop techniques, procedures, and projects that would be impossible in traditional courses.

Mission Statement

"The Enterprise Program employs a multi-disciplinary, team-based approach to address real-world projects in a business-like setting." To this end the Enterprise Program provides:

- Opportunities for students and faculty to develop entrepreneurial and innovative professional skills that are appropriate for all disciplinary fields at Michigan Technological University
- Multidisciplinary design experiences that involves a wide range of disciplinary programs such as Business, Sciences, and Humanities
- A framework for faculty to mentor students in a learning setting that closely resembles an industrial or professional environments
- Learning activities that arise from the approaches used to solve real-world problems, which are provided by industrial and professional sponsors
- An environment in which the students' fundamental background in science and engineering in the context of a problem where non-technical issues, such as cost or societal impacts, are of equal importance
- Students are provided opportunities to participate in activities that coincide with the stages of their professional development

Goals and Objectives

The goals and educational objectives of the Enterprise Program are to provide a learning environment and experience that will produce graduates who have

- Strong skills in communication and persuasion
- The ability to lead and work effectively as a member of a multi-disciplinary team
- A sound understanding of non-technical forces that affect engineering decisions
- An awareness of global markets and competition
- Demonstrated management skills and a strong business sense

Educationial Assessment

Assessment tools have been implemented to evaluate the effect of the Enterprise experience on three key elements of the program:

- The ability to work effectively on multi-disciplinary, multi-functional teams
- The ability to communicate effectively in oral, written and visual media
- The ability to operate a business, including understanding, developing, and implementing the various elements of an effective business plan

Assessment consists of four main evaluation methods:

- External review and assessment feedback reports from industry sponsors
- Evaluation of written and oral communication by a panel of faculty and staff. This evaluation is primarily performed on Final Annual Reports, Strategic Plans and Final Presentations
- Periodic surveys or questionnaires developed by faculty, staff and students to evaluate various aspects of the program including curriculum, facilities, operations and finances
- Review of Teaming course videos

Assessment results are collected and analyzed by both the Enterprise Faculty Advisors and a core set of faculty who are responsible for delivering the courses that support the Enterprise curriculum.

On a bi-annual schedule the assessment plan and tools are evaluated as to their effectiveness and usefulness in providing data to be used for improvement of the program.

Long-Term Strategic Plan

The long-term strategy of the Enterprise Program is

- To establish and maintain ~25 viable Enterprises
- To solicit funds to support these Enterprises
- To have approximately 450 students involved in the Enterprise Program on an annual basis
- To have representation on Enterprise teams from all disciplines on campus
- To provide the necessary facilities and supervision that is safe and effective as to allow each Enterprise to become successful
- To have over the next five years sustainable spin-off companies that are developed and operated by Enterprise Students upon graduation

Part I
Enterprise Program & Team Administration

I.1 Financial Management

By design, operational expenses of the Enterprise Program are intended to be covered in large part through industry contributions. There are currently two paths for industry participation: the Industry Partners Program and the Enterprise Stakeholders Program.

Industry Partners Program

The College of Engineering actively seeks to secure an industry partner for each full Enterprise Team. Industry Partners are asked to make the following commitment to the program:

- A three-year financial commitment of $40,000 per year for Enterprise Courses, supplies, equipment and student travel
- Identification of a real-world engineering topic of interest to industry
- Designation of industry professionals as "mentors' who communicate with students by phone and e-mail about technical matters
- Two visits to the campus for program planning and evaluation of student reports and presentations
- Provision of materials relevant to the project
- Access to testing and processing facilities not available on campus

Two or more partners can co-sponsor a team and share in the commitment.

Enterprise Stakeholders Program

Companies, organizations, and individuals who desire to support the Enterprise Program, but do not want to make the full partnership commitment have the option of participating through the Stakeholders program. As an Enterprise Stakeholder, they will be helping to fuel continued growth and development of the Program. Funds raised through the Enterprise Stakeholders Program are intended to help subsidize team-project operating expenses and program administration. Stakeholders can choose to direct their financial contribution toward one or more of the areas listed below, or allow the College of Engineering direct the funds toward the area of greatest need:

Enterprise Scholarships	Course Development
Project Expenses for Team(s) of Choice	Computer Hardware/Software
Tools and Equipment	Facilities and Furnishings
Enterprise Program Administration	Enterprise Course Delivery
Faculty Professional Development	Industry Guest Lectureships

All Enterprise Partners and Stakeholders can expect the following benefits:

- First-hand observation of the capabilities of undergraduates in one of the largest engineering schools in the nation
- The opportunity to gain exposure for your company among talented students with strong technical, design, and business skills
- The opportunity to influence the future direction of one of the most innovative undergraduate educational programs in the country and the skill-sets of its future graduates.

Gift-in-Kind contributions to the Enterprise Program are considered an investment through the Stakeholder's Program, and as such, investors will be allocated the benefits according to the equivalent monetary value of the gift item.

An investment in the Enterprise Stakeholders Program is considered a tax-deductible gift to the Enterprise Program.

Partner and Stakeholder Funds Allocations

Of the $40K annual partnership funds raised, approximately one-third will remain with the College of Engineering to support administrative and operational costs of the program. The balance will go directly to the Enterprise selected by the Partner for team operational expenses.

Stakeholder funds raised above and beyond the partnership funding will be allocated in full to the area selected by the investor.

Enterprise Team operational funds are to be budgeted and managed at the discretion of that Enterprise's management team, under the guidance of the faculty advisor. Funds should be used for expenditures appropriate to the Enterprise Program and will include, but are not limited to, supplies, materials, equipment, and travel associated with the Enterprise project activity. Each Enterprise team is required to submit to the College, at the end of each semester, a financial report summarizing the team's expenditures versus its annual budget.

I.2 Enterprise Curriculum

Overview

The Enterprise Program curriculum consists of a unique combination of coursework and project work. The curriculum is designed to provide great flexibility in course and project selection, while at the same time accomplishing the educational objectives outlined in the Mission and Goals Statements. The program is designed such that students can participate in the Enterprise program at different levels:

- Completion of the university-approved **Enterprise Minor**, which requires a total of 20 semester credits: http://www.enterprise.mtu.edu/students/minor.html
- Completion of an **Enterprise Concentration** within a degree program, which consists of 12 semester credits in most engineering programs: http://www.enterprise.mtu.edu/students/concentration.html
- Completion of an Enterprise-defined project in **fulfillment of the major senior design/research** requirement in most degree programs. This level of participation may require between 6 and 8 semester credits, depending upon the student's major.

More detailed descriptions of each level of Enterprise participation are provided in Appendix I.

Procedure for Implementing Curricular Change

As the Enterprise program evolves and assessment activities provide direction for continuous improvement of the program, changes in the Enterprise curriculum will be inevitable. Proposed changes will need to be considered for individual courses as well as in the curricular requirements for the Enterprise Minor, Enterprise Concentrations and the one-year Enterprise experience. This section outlines the procedures to be used for each level of curricular revision:

Course Modifications
Revisions in individual courses will follow the university-established procedure and timeframe for all course modifications. Through this process courses can be deleted, added and changed. All departments with degree programs (including concentrations), minors and certificate programs, which are affected by a course change must be notified and give approval prior to the implementation of the change. For the purposes of reviewing the impact of proposed course changes on the Enterprise program the Enterprise Faculty Advisory Group will be consulted and must give approval through a majority vote on all relevant modifications. In addition, modifications to all courses with ENG prefixes must be proposed, discussed and approved by the Enterprise Governing Board in conjunction with the course instructor(s) prior to submitting the course modification through the university system.

Changes in Enterprise Minor Requirements
The Enterprise Minor is jointly administered by the College of Engineering and the School of Business and Economics. Proposed changes to the requirements for the Enterprise Minor must be submitted to the Associate Dean for Academic Programs in the College of Engineering and the Associate Dean of the School of Business and Economics for consideration and final approval.

Changes in the Enterprise Concentration within Engineering Programs

The appropriate faculty committee within each degree program may propose changes in course/credit requirements for the Enterprise Concentration in their program. However, since the Enterprise Concentration is officially recognized by the university and designated on the degree transcript as such, final approval of changes to the 'Concentration' requires approval from the appropriate Dean of the College/School or her/his designee.

Changes in the Yearlong Enterprise Requirements
The appropriate faculty committee within each degree program has complete authority to establish the credit/course requirements for their majors who choose to participate in an Enterprise as a means of satisfying the major design/research requirement for the degree.

Enterprise Courses

An important part of the Enterprise Program is the development and delivery of relevant courses to support students in the operation and management of their Enterprises. Enterprise funds will be used for instructional support of courses that are considered of interest and/or importance to most Enterprises and their team members.

Introduction of New Enterprise Courses
Any faculty interested in supporting the Enterprise program can propose new courses. Proposed courses will be submitted to the Enterprise Governing Board for consideration and approval. If approved, the necessary paperwork will be submitted to the appropriate university entity for course addition approval.

For new courses that are considered 'Enterprise-specific', that is, those that are not applicable in nature to be attractive to most or all Enterprise students, no compensation for the delivery of the course will be provided through Enterprise Funds. Therefore, a successful proposal of this type must include a description of how the course will be supported and who will be responsible for delivering the course on a continuing basis.

Phase out of Existing Enterprise Courses
The elimination of an Enterprise Course will be decided based on student interest as determined through course enrollment. If a given course cannot be offered due to insufficient enrollment for three (3) consecutive offerings, the requisite paperwork for dropping the course will submitted to the appropriate university entity for course deletion.

Delivery of Enterprise Courses

Enterprise courses are taught by faculty from across a wide range of disciplinary expertise (i.e., Business, Economics, Communication, Engineering, Ethics, Globalization, etc.) The mode of delivery is at the discretion of the faculty member teaching the course, and innovative, non-traditional formats are encouraged: weekend meetings; accelerated schedules; online or hybrid courses, etc.

Compensation for teaching Enterprise courses is based on an overload arrangement, with $2,000 per one-unit course deposited into a faculty member’s incentive account.

Advertising/Promotion of Enterprise Courses

The Enterprise Program maintains a web page for upcoming, current, and planned courses: http://www.enterprise.mtu.edu/students/. Faculty are encouraged to update course offering, times, dates, materials, and links to syllabi. [This part of the Enterprise site is being updated for fall 2004: send any materials to Michael – mmoore@mtu.edu]

Note that in order to "make," a course needs to enroll at least 10 students.

I.3 Operating Procedures: Administrative

Introduction of New Teams

The Program's Industrial Project Manager, Mary Raber, welcomes and encourages inquiries and new team proposals at any point during the year. Keep in mind, however, the timing of developing a new Enterprise Team requires strategic and logistical planning based on space availability, recruiting, and industry sponsor development. See the "Procedures for Proposing and Developing a New Enterprise Team" form in Appendix III for the first steps to take in proposing a new Enterprise Team.

Student Registration

Student team members enroll in course designations for their academic status and the appropriate academic term:

Enterprise Project Work I: ENG2950 (sophomore, fall)
Enterprise Project Work II: ENG2960 (sophomore, spring)
Enterprise Project Work III: ENG3950 (junior, fall)
Enterprise Project Work IV: ENG3960 (junior, spring)
Enterprise Project Work V: ENG4950 (senior, fall)
Enterprise Project Work VI: ENG4960 (senior, spring)

In addition, each Team has its own specific section numbers. For example, for Enterprise Project Work II (ENG2960) the spring 2005 schedule of classes includes:

82749 ENG 2960 L01 Prism
82750 ENG 2960 L02 R Blue Marble Security
82751 ENG 2960 L03 R Wireless Communications, Inc.
82752 ENG 2960 L04 M Future Truck
82753 ENG 2960 L05 T Formula SAE
82754 ENG 2960 L06 Mini BAJA
82755 ENG 2960 L07 T Clean Snowmobile Challenge
82756 ENG 2960 L08 R Consumer Product Manufacturing
82757 ENG 2960 L09 R Aqua Terra Tech
82758 ENG 2960 L10 W Information Technology
82759 ENG 2960 L11 Planning & Development
82760 ENG 2960 L12 TR Pavement Design
82761 ENG 2960 L13 W Automotive Systems, Inc.
82762 ENG 2960 L14 Nanotechnology Enterprises
82763 ENG 2960 L15 W Robotic Systems
82767 ENG 2960 L19 R Integrated Microsystems
82768 ENG 2960 L20 Entrepreneurial Ventures
82764 ENG 2960 L21 Aerospace Enterprise
83196 ENG 2960 L23 W Alternative Fuels Group
83458 ENG 2960 L24 Innovative Castings

Project and Enterprise Courses Scheduling

Some Enterprise Courses have team-specific enrollments. For example, in the fall 2005, **ENG2961 Teaming:**

R01 & L01 - Enroll by Team affiliation: Pavement Design, Materials and Construction, Planning and Development, Aerospace, Blue Marble, and Consumer Product Manufacturing
83120/83862 R01/L01 T 1605-1755

R02 & L02 - Enroll by Team affiliation: Future Truck, Robotics, ITOxygen, Aqua Terra Tech, and Alternative Fuels Group
83121/82863 R02/L02 T 1605-1755

R03 & L03 - Enroll by Team affiliation: Formula SAE Car, Automotive Systems, Clean Snowmobile Team, Mini Baja
83122/82864 R03/L03 R 1605-1755

R04 & L04 - Enroll by Team affiliation: Wireless Communication, PrISM, Integrated Microsystems and Innovative Castings
83123/82865 R04/L04 R 1605-1755

Other courses have weekend or flexible delivery arrangements. The most recent course info is found at http://www.enterprise.mtu.edu/students/ and it is good practice to keep student team members updates via your team LISTSERV.

Student Team Member Enrollment & Recruiting

"Volunteer" and unenrolled-student participation is not permitted in the Enterprise Program. In order for a student to participate on an Enterprise Team, she or he must be enrolled in an appropriate Enterprise project course.

There are numerous venues for recruiting students across the MTU campus: visiting classes, poster sessions; table tents; new-student orientation sessions; departmental functions; student organizations, and participating in Enterprise Program Speakers Series, where Team representatives can visit departments and showcase your Team's work and invite new students to join.

This is also a good opportunity to think about the benefits of increasing the cross-disciplinary nature of your Team. Several MTU departments have no current Enterprise Team affiliations, but have students who seek this kind of real-world, hands-on professional development.

Role of Home Department

Enterprise Team home departments support the Enterprise Program and Enterprise Teams by providing current news and updates to students and to faculty about Enterprise initiatives and opportunities, by publishing and distributing Minor and Concentration options, and by encouraging participation on Enterprise Teams.

Home departments support Enterprise faculty by providing release time from teaching responsibilities, access to professional development activities, where faculty can integrate professional, scholarly, and research interests to the Enterprise experience, and by providing additional advising, registration, and course-requirement support.

Soliciting, Developing, and Sustaining Industrial Support

Enterprise faculty advisors, and in some cases, home departments, collaborate with Mary Raber, the Project Industrial Manager, to identify and to develop Industry support for Enterprise Teams.

Enterprise Computing Lab Fees

Enterprise team-member computing fees currently support:

- Telcom infrastructure costs
- Network connections
- Disk space
- Network maintenance and security
- Photocopiers
- FAX

Faculty Advisor Compensation System

Current workload formulas allow Enterprise advisors release time from one course over the year for their work in the Program. Enterprise advisors are provided $2000 in incentive compensation per semester for their advising work with the Program; funds are dependent upon the submission each term of external review and assessment feedback reports from industry sponsors.

I.4 Publications, Dissemination, and Outreach

The College of Engineering will maintain and publish information about the Enterprise Program through various sources including those identified below. Publications and PR materials developed by individual Enterprise teams are required to provide appropriate reference to the Enterprise Program.

Website
http://www.enterprise.mtu.edu/

The Enterprise Program maintains a website intended to provide general information about the program for current and potential sponsors and students. Information will include the following:

- Program Overview
- Partnerships Opportunities
- News & Archives
- Faculty and Staff Contacts
- Industry Partners
- Enterprise Team Information
- Curriculum

In addition, each Enterprise Team is encouraged to develop a website with information specific to the operation of their team. Enterprise Teams should provide reference to their Industry Partner, including a link to the partner's website. Links to individual Enterprise websites will be provided from the main Enterprise website.

Industry Brochure
The Program is developing a brochure intended for current and prospective Enterprise Partners and Stakeholders. The brochure will provide a general overview of the program and each Enterprise team, key contact information, and details on the partnership and stakeholder opportunities. The brochure will be updated as appropriate on an annual basis. Brochures will be distributed through various sources including Corporate Service, Michigan Tech Fund, and Enterprise events.

Student Brochure
The Enterprise Program is developing a brochure targeted toward prospective MTU and/or Enterprise team members. This brochure will outline general information about the Enterprise curriculum, benefits to students, and Enterprise team information. The brochure will be updated as appropriate on an annual basis. Brochures will be distributed through various sources including Admissions, current Enterprise faculty, staff and students, and Enterprise events.

Resume Book
A book (CD-ROM or online) of Enterprise student resumes will be published annually. Enterprise students will be expected to submit a current resume to the College of Engineering in September of each year. Resume books will be distributed to Enterprise Stakeholders and Partners, and as a promotional item and various MTU and Enterprise events.

Annual Report
The College of Engineering will publish an annual report at the end of each academic year. This report will outline program activities and accomplishments for each year, operating expenditures versus budget, industry partners and stakeholders, and individual team highlights. This report will be distributed to Enterprise Partners and key university faculty, staff and administration.

Enterprise Newsletter
The College of Engineering will publish a semi-annual newsletter at the end of each semester, highlighting major program and team accomplishments for that semester. Enterprise faculty, staff and students will periodically be invited to contribute articles for publication.

Dissemination
In conjunction with the original NSF grant which provided funding toward the development of the Enterprise Program, principle investigators, faculty advisors and course instructors are expected to seek out opportunities to disseminate findings and results associated with the operation of the Enterprise Program to benefit other academic institutions which might be interested in establishing a similar program. Copies of any Enterprise related papers that are presented or published should be submitted to the College of Engineering.

I.5 Advisory Boards

Enterprise Program Student Advisory Board

The Enterprise Program's Student Advisory Board serves as a link between the different Enterprise Teams at Michigan Tech; they provide a mechanism for Enterprise students to address issues of concern; to utilize the knowledge of each Enterprise Team to assist other Teams in solving problems; to inform the administration and faculty of the concerns and issues facing students in the Enterprise Program; and to offer recommendations for solving problems or acquiring contact information for appropriate support personnel. One member of the Student Advisory Board will serve as an *ex officio* member of the Governing Board.

Enterprise Program Governing Board

In order to better serve the needs of the Program and to facilitate effective administration, an Enterprise Governing Board was established in 2003. The membership of the Board consists of: 1) the Enterprise coordinator, 2) the Enterprise shop manager, and 3) three or four faculty from diverse departments who are Enterprise advisors. The Associate Dean of Engineering will serve as the chair. In addition, a Student Advisory Board will be established that consists of student leaders from the Enterprise program. The Governing Board will make recommendations to the Dean of Engineering regarding policy and procedures for the Enterprise program in the following areas:

- Budgeting
- Faculty rewards
- Enterprise Strategic Planning
- Shop practices
- Program assessment
- Administration of the Enterprise minor
- Training of Enterprise advisors regarding best practices
- Development of new Enterprises/phase-outs of non-functioning Enterprises
- Finding or removing advisors
- Phasing out non-functional Enterprises

The Governing Board will meet regularly with agendas set by the Enterprise coordinator. Members of the Governing Board will be responsible for ensuring that policies that are established are carried out. Failure to do so will result in removal from the Board. Board members will be appointed by the Associate Dean of Engineering and will nominally serve a three-year term, renewable to six years. A board member can be removed either a) by the Associate Dean of Engineering or b) through a majority vote of the Board.

Industry Advisory Board

An industry advisory board, established by the COE, includes representatives from industry, primarily from stakeholder and partnering companies and organizations. The board will be expected to meet once per semester and address issues of relevance to the educational partnership between industry and university such as Enterprise Courses, industry participation, and funding.

Part II
Operating Procedures: Team Operations & Management

II.1 Overview

Your experience on an Enterprise Team requires the knowledge and experience you learn in courses here at Michigan Tech — think of it as *putting that learning into action*; it also requires that you learn about industry standards, techniques, and practices.

The Enterprise experience is neither purely academic, nor a purely industrial experience. Rather, we are creating a new and innovative learning experience where you apply your training, ideas, disciplinary expertise, and teamwork in ways that draw on the best of academic and industrial contexts.

How does this learning environment affect and support your experience on an Enterprise Team?

- You have to be an excellent, pro-active problem solver
- You need to weigh the values, needs, and positions of several academic, industrial, and support stakeholders
- You draw on multiple disciplinary contexts in the design, manufacturing, testing, and prototyping of products and services
- You practice financial and management techniques that bridge – and innovate — academic and industrial practices

The Governance, Deliverable, Financial, and Resource sections that follow need to be read in both the contexts of your team's goals, organization, and culture *and* the Enterprise's overall goals in sustaining an accredited learning environment. Not all information will be used the same by all teams, and we invite you to submit your own models for organization and practice for inclusion in the next edition of this Manual.

II.2 Governance

Advisors and team members generally collaborate on deciding the appropriate governance and hierarchy for your team.

Some teams elect an executive board drawn from team leaders, who then make strategic and policy decisions in concert with the faculty advisor and, in some cases, with input from and industry sponsor. Some team's advisors serve as non-voting members of those executive boards; others play more active, hands-on roles.

Some teams appoint representatives from project and design sub-teams to represent the interests and needs of members who may be working on multiple and cross-project groups.

Some team advisors appoint team executives who are responsible for the day-to-day operations of the Enterprise team, and negotiate strategic and policy decisions with the advisor.

You can see that there are numerous ways to organize and administer your teams. Early experience in the Enterprise Program reveals, however, certain practices that help to guarantee cohesion and sustainability:

- **Provide** all team members – new and returning – with an organizational chart each semester that shows who is responsible for what, who answers to whom; and the governing relationships for the overall team and its various project and communication
- **Make** your voting, election, and administrative terms explicit in your team's bylaws or charter; update as needed
- **Invite** newer team members to join conversations about team governance and administration
- **Develop** clear channels of communication between team members and between team members and advisors about team governance and administration issues; formalize those communication channels, if needed, via weekly meeting agendas, or the appointment of an administrative task team to explore options
- **Document** all discussions and plans for team governance and administration issues where all team members can both access them and provide feedback
- **Apply** your experience in management courses and teaming to imagine and to implement productive team governance and administration procedures
- **Visit** other teams and ask about their team governance and administration procedures; ask your Enterprise Student Advisory Board (ESAB) representative to provide examples from other teams

In all of these cases, you will notice the pressing need for negotiation and consensus. No organization runs smoothly and productively based on informal or undocumented approaches to administration, and this opportunity to design and develop governance possibilities for your team will serve you well in both your Enterprise and professional experiences.

II.3 Team Deliverables

Strategic Plan

Each enterprise is required to complete (or update) a comprehensive strategic plan outlining the goals and objectives of their Enterprise. Contents should include, but are not limited to, the following:

- Mission Statement
- Annual Goals and Objectives
- Organizational Structure
- Project Timelines
- Annual Operating Budget
- Recruiting and Marketing Plans
- Operating Procedures: Documentation, Grading Policies, etc.

Strategic plans should be considered living documents to be updated as needed each semester, or as strategic objectives/procedures change. Each Enterprise Team submits a copy of their Strategic Plan to the Industrial Project Manager by the end of fall semester each year. http://www.enterprise.mtu.edu/deadlines.html

Annual Report

At the conclusion of each academic year, each Enterprise is required to submit an annual report outlining the accomplishments of the business. Contents of the report should include, but are not limited to, the following:

- Accomplishments vs. Goals
- Lessons Learned
- Financial Status – summary of all expenditures by account, including credit card and checking accounts
- Organizational Issues
- Goals for next academic year

Presentations

Each Enterprise is required to participate in two annual poster sessions sponsored by the COE:

- The Fall Poster Session, which is held in October of each year to coincide with the MTU Recruiting Fair. Enterprises are expected to have a poster presentation highlighting their business objectives for the year.
- The Undergraduate Expo is held in April of each year. Enterprise teams are expected to have both a poster and an oral presentation highlighting key accomplishments for the year. Additional presentations are at the discretion of the individual Enterprise and its industry partner(s). Some industry partners may request additional presentations be made throughout the academic year.

II.4 Grading, Assessment, and Evaluation

Each Enterprise Team develops its own grading, assessment, and internal evaluation plans.

We recommend that the faculty advisor and team leaders revisit grading policies at the end of every semester in order to maintain on ongoing, open discussion about this necessary aspect of the Enterprise experience.

Because we operate in an educational environment and are an accredited education program, teams, advisors, student team members and administrators need to remain keenly aware of university and departmental policies regarding grades. This is another area where teams can take initiative and develop professional and evaluative process for enrolled team members so that team members are rewarded for their efforts while, at the same time, less-engaged team members are held accountable for their participation.

We have included in this manual four examples of how teams address grading. In **Appendix II** you will find current grading plans for Wireless Communication, Automotive Systems Engineering, Consumer Products Manufacturing, and ITOxygen. Note that these four teams take different approaches to grading, but all of them highlight, promote, and require excellence in:

- Design Experience
- Communication
- Participation
- Teamwork
- Project Development
- Accountability and Documentation
- Professionalism
- Collegiality
- Problem Solving

II.5 Financial Accounting and Reporting

Enterprise Teams are responsible for ensuring accurate budgets, financial accounting, and record-keeping, as would any professional organization. In our university context, we are responsible for multiple oversight areas.

Enterprise Team Budgets

Team Advisors submit budgets for the following year during week 12 of the spring term. The budget proposal package includes:

- Accounting of previous year's budget (including preliminary end-of-year +/- figures through the end of the Spring term)
- Next year's anticipated budget

Sample Enterprise Team Budgets

Accounting of previous year's budget, and justification for subsequent year's budget:

To: Mary Raber, Enterprise Program Industrial Project Manager
From: Widget Enterprise Team
Re: FY 2002-03 and 2003-04 Budgets
Date: March 13 2004

Below you will find our Budget Report for 2003-04 and our Proposed Budget for 2004-06. Our Actual/Budgeted Expenses for 2002-03 came in within $1.00 of our projections.

For 2003-04 we are adding a new item request: a Smartboard. While we are still soliciting bids from vendors, we anticipate a $3750 expenditure. We need the Smartboard in order to facilitate increased collaboration between our design teams and administrative teams. Also, the Smartboard allows for real-time, virtual interactions with our vendors and industry sponsor, during which we can share documents, complete online editing sessions, and brainstorm widget dimensions with a coordinating engineer in our partner's shop, who uses the same Smartboard technology.

This year's expenditures also include $6500 for widget parts, which will keep us in supply for two years. Because of this discounted bulk purchase, we anticipate no widget-part expenditures for 2004-04.

If you can answer any questions or address any concerns about our Budget Reports, please contact our Team President or Faculty Advisor at team@widgetenterprise.edu.

WIDGET ENTERPRISE BUDGET REPORT: 2002-03

Totals	Actual	Budgeted	Over/Under
Revenues	11,890.00	11,300.00	590.00 over
Expenses	11,960.00	11,961.00	1.00

Notes:

Revenues

Revenue Sources	Actual	Budgeted	Over/Under	Notes
Winter Carnival Fundraising	2,700.00	2,200.00	500.00 over	
Cylinder sales	8,950.00	8,900.00	50.00 over	
T-shirts sales	240.00	200.00	40.00 over	
Total revenues	11,890.00	11,300.00	590.00 over	

Expenses

Expense Categories	Actual	Budgeted	Over/Under	Notes
Two laptop computers	3,750.00	3,750.00	at budget	
Plastic widget parts	3,200.00	3,500.00	300.00 under	
Travel	3,500.00	3,000.00	500.00 over	
Supplies	100.00	100.00	at budget	
Routers	1,200.00	1,500.00	300.00 under	
Phone	210.00	111.00	99.00 over	
Total expenses	11,960.00	11,961.00	1.00 under	

Subsequent year's proposed budget:

WIDGET ENTERPRISE PROPOSED BUDGET 2003-04

Proposed Budget

Expense Categories	Budgeted	Notes
Smartboard	3,750.00	Currently seeking lower bids
Plastic widget parts	6,500.00	Two years worth of widgets
Travel	3,000.00	
Supplies	100.00	
Routers	1,500.00	
Phone	300.00	
Total expenses	15,150.00	

Purchasing and Managing Team Funds

It is important for Team advisors and Team financial leaders to understand how funds and purchasing are managed in MTU Accounting and in the Enterprise Program — for example, when to use your Purchasing Card, and when to use a Purchase Requisition when making purchases.

One benefit to using your Purchasing Card is that it minimizes the paperwork and process of submitting a Purchase Requisition. There are limits placed on Purchasing Cards ($2,499.99 for single items), however, and the university has created a list of "Prohibited Items" that are blocked from activity on your card: http://www.admin.mtu.edu/pur/purchcard/prohib.html

Purchasing Cards

Accounting Services provides these examples as appropriate Purchasing card uses:

- Anything not on the prohibited list and is $2,499.99 or less
- Subscriptions
- Software Upgrades

As the official cardholder, upon receiving the monthly billing statement, advisors reconcile items to be sure that amounts charged on the original invoices, sales slips, or receipts match the monthly statement. The original invoices, sales slips, or receipts, must include a descriptive itemization listing items purchased, quantities, prices, and vendors' names. Both the receipts and the monthly billing statement should be kept together in a file for three (3) years. http://www.admin.mtu.edu/pur/purchcard/index.html

Team Faculty Advisors are responsible for reconciling and reallocating your Purchasing Cards each month. This is usually done when you receive your monthly statement from Elan Financial Services, the card's issuer:

- Review your monthly statement to ensure that all charges are accurate and belong to your Team; reconcile unresolved or mysterious charges
- Take your Elan Purchasing Card statement to your department's administrative assistant, produce relevant receipts, and provide an index for reallocating the balance
- Maintain an ongoing Purchasing Card Log, such as the one provided by Accounting Services http://www.admin.mtu.edu/pur/purchcard/purchcard_log.xls

Purchasing Card Log

Last 3 digits of card # _____

Card Holder Name _____ Index Charged _____

Date Ordered	Person Ordering	Vendor	Item Description	Price Quoted	Charge to Index	Expense Acct Code

Purchase Requisitions

Accounting Services lists these examples as appropriate for Purchase requisitions:

- Advertising
- Animals
- Calling/business cards, & envelopes
- Business Card Request Form
- Chemicals
- Controlled substances
- Cylinder gases & liquid nitrogen
- Equipment/furniture
- Leases & rentals
- Maintenance agreements
- On-campus repair service
- Professional/Classified services & related expenses
- Renovations or remodeling
- Reserving rooms for meetings in advance for local events
- Services from non-employees that have been invoiced
- Almost anything else, including most items on the prohibited list for the Purchasing Card and petty cash items that exceed petty cash limits

 Purchase Requisition Form
http://www.admin.mtu.edu/pur/pdf/purchase_requisition.pdf

Check Requests

Accounting services accepts Check Requests for these items:

- Fellowships
- Honorariums
- Lodging Deposits
- Lodging Expenses for Non-Employees
- Memberships
- Miscellaneous expenses not covered by petty cash
- Refunds/overpayment

Travel

Teams have options to consider when planning Enterprise-based travel:

- Team members can pay for travel and hotels and request reimbursement upon their return
- Team members can make travel arrangements via Sherry Saarinen in 712 M&M (7-2005); Sherry will need your Team's account # for charges
- Team members can complete a formal Travel request

Petty Cash

Cash expenditures for $100 or less may be paid by any departmental administrative assistant, provided that receipts are produced and an index for reallocation is provided.


Petty Cash Reimbursement Request Form
http://www.admin.mtu.edu/acct/pdf/petty_cash_reimbursement.pdf

These and all other Accounting Services forms can be found at
http://www.admin.mtu.edu/acct/dept/acctpay/forms.html.

II.6 Facilities & Computing Resources

Computing

The Enterprise Program contracts with the East Engineering Computing Network EECN to support the computing and poster-printing needs of Enterprise Teams.

EECN Online resources can be found at http://www.eecn.mtu.edu/resources/. Of particular importance for team management and team members are poster printing (deadlines and technical requirements), maintenance schedules, and lab access.

EECN Staff
Robert Landsparger, Dir. East Engineering Computing: rel@mtu.edu
207 Dillman Hall

Kenneth Palosaari, Computer Support Specialist: kenp@mtu.edu
861 Dow ESEB

Thomas Gemignani, Computer Support Specialist: tomas@mtu.edu
U201 M&M Building

David Torrey, Sr. System Administrator/Programmer: tj@mtu.edu
327 M&M Building

Michigan Tech & University Relations Web Standards

New university WWW standards and guidelines go into effect during the fall 2004 term:
http://www.admin.mtu.edu/urel/webresources/standards.html
http://www.admin.mtu.edu/urel/webresources/guidelines.html

Teams need to make sure that all of their Enterprise-related web pages comply with the new standards and guidelines, including:

- From your main index page incorporate a "Michigan Tech" logo that links to the MTU home page (you can choose an MTU logo here: http://www.mtu.edu/wwwhelp/logos.html)
- Clearly marked references and links to both MTU and to the Enterprise Program sites
- A contact name and e-mail address for team info
- A contact name and e-mail address for web-site info

Facilities

Building Card-Swipe Access
Student team members enrolled for Enterprise Team credit automatically have card-swipe access to the Minerals & Materials building and their Team's office space. Submit additional card-swipe access requests to Mary Raber at mraber@mtu.edu.

COE Conference Room: 724 M&M
Enterprise faculty advisors and team members may reserve the COE conference room in 724 M&M for meetings, conference calls, and presentations. For planning purposes, note that the COE has priority in scheduling the room, and some time blocks are scheduled weeks and months in advance.

The COE requests that the room be left clean and organized after using it (tables are wiped, garbage is removed, and chairs/tables returned to their previous position).

720 M&M: Photocopier and FAX Area

Teams have access to M&M 720, where this equipment is found:

- Fax machine (906-487-2770)
- Photocopier
- PC and scanner
- Printers: Black & White (Kahn) and Color (Galileo)
- Team mailboxes

Projector, Video Camera, and Office Equipment

Enterprise faculty advisors and team members can reserve and check out an overhead projector, a video camera, tripod, and a conference speaker phone from the COE office in 712 M&M.

COE Shop

Ed Sauvola: esauvola@mtu.edu
Facilities Coordinator, College of Engineering
Phone: (906) 487-3358

Ed Sauvola maintains a regularly updated Shop Manual available in print in Appendix IV or online at http://www.enterprise.mtu.edu/shop/

Appendix I
Enterprise Curriculum

The Enterprise Concentration
The Enterprise 20-Unit Minor
Enterprise Courses

The Enterprise Concentration Option

Most MTU Departments and Programs offer a 12-credit Enterprise Concentration option. If you are interested in the Enterprise Concentration, please contact your academic advisor to determine applicability to your major.

The following courses are required for the Enterprise Concentration:

Six Credits of Enterprise Project Work:

- ENG 2950 - Enterprise Project Work I (1 unit)
- ENG 2960 - Enterprise Project Work II (1 unit)
- ENG 3950 - Enterprise Project Work III (1 unit)
- ENG 3960 - Enterprise Project Work IV (1 unit)
- ENG 4950 - Enterprise Project Work V (2 units)
- ENG 4960 - Enterprise Project Work VI (2 units)

Six Credits of Enterprise Instructional Modules (* designates Gen Ed.-applicable Courses): A minimum of 3 of these credits must be modules in business and/or communications selected from the following list of courses:

- ENG2961 - Teaming in the Enterprise (2*)
- ENG2962 - Communications Contexts (1*)
- ENG3962 - Communication Strategies (1*)
- ENG4952 - Complex Communication Practices (1*)
- ENG3954 - Enterprise Market Principles (1)
- ENG3961 - Enterprise Strategic Leadership (1*)
- ENG3963 - Enterprise Entrepreneurship (1)
- ENG3964 - Project Management (1)
- ENG3971 - Seven Habits of Highly Effective People (1)
- ENG4951 - Budgeting - Intrapreneurial Engineering (1)
- ENG4954 - Global Competition (1*)

The remaining 3 credits can be selected from the above list, or the following additional courses:

- ENG2963 - Electronic Circuit Design and Fabrication (1)
- ENG3955 - Conceptual Design/Problem Solving (1)
- ENG3956 - Industrial Health and Safety (1)
- ENG3957 - Product and Process Development I (1)
- ENG3958 - Engineering Ethics in Design and Implementation (1)
- ENG3966 - Design for Manufacturing (1)
- ENG3967 - Product and Process Development II (1)
- ENG3968 - Manufacturing Processes and Simulation (1)
- ENG3969 - Project Phases of Design and Implementation (1)

The Enterprise 20-Unit Minor Curriculum Requirements

One of the following courses must be taken:

- ENG2961 Teaming in the Enterprise (2 credits*)
- BA2700 Business Problem Solving (4 credits)

A minimum of 7 Project Credits from the following list:

- ENG2950 Enterprise Project Work I (1 credit)
- ENG2960 Enterprise Project Work II (1 credit)
- ENG3950 Enterprise Project Work III (1 credit)
- ENG3960 Enterprise Project Work IV (1 credit)
- ENG4950 Enterprise Project Work V (2 credits)
- ENG4960 Enterprise Project Work VI (2 credits)

A minimum of 2 Communication Credits from the following list**:

- ENG2962 Communication Contexts (1 credit*)
- ENG3962 Communication Strategies (1 credit*)
- ENG4952 Complex Communication Strategies (1 credit*)
- ENG4953 Writing about Engineering in a Societal Context (1 credit*)
- CM3410 Technical Communications for Chem. Engr. (3 credits*)
- HU3120 Scientific and Technical Communications (3 credits*)

** Students completing BA2700 are not required to complete any additional communication credits in fulfilling the Enterprise Minor requirements.

A minimum of 5 business credits from the following list:

- EC3400 Economic Decision Analysis
  OR EC/ENG3401, 3402 or 3403 (1-3 credits*)
- EC3001 Principles of Economics (3 credits*)
- ENG3954 Enterprise Market Principles (1 credit)
  OR BA3800 Principles of Marketing (3 credits)
- ENG3961 Enterprise Strategic Leadership 1 credit*
  OR BA4760 Strategic Leadership (3 credits*)
  OR AF3001 USAF Leadership Studies I (3 credits*)
- ENG3963 Enterprise Entrepreneurship (1 credit)
  OR BA3780 Entrepreneurship (3 credits)
- ENG3964 Project Management (1 credit)
  OR BA4610 Project Management (3 credits)
- ENG3971 Seven Habits of Effective People (1 credit)
- ENG4951 Budgeting - Intrapreneurial Engineering (1 credit)
- ENG4954 Global Competition (1 credit*)

The remaining credits to fulfill the 20 credits required for this minor may be satisfied by taking additional courses from any of the lists above or from the following list:

- ENG2963 Electronic Circuit Design and Fabrication (1 credit)
- ENG3955 Conceptual Design/Problem Solving (1 credit)
- ENG3956 Industrial Health and Safety (1 credit)
  OR CM4310 Chemical Process Safety/Environment (3 credits)
- ENG3957 Product and Process Development I 1 credit
- ENG3958 Engineering Ethics in Design and Implementation

OR CE3331 Professional Practice (1-2 credits)

- ENG3965 Material Flow in an Industrial Society (1 credit)
- ENG3966 Design for Manufacturing (1 credit)
- ENG3967 Product and Process Development II (1 credit)
- ENG3968 Manufacturing Processes and Simulation (1 credit)
- ENG3969 Design Implementation Project Phases (1 credit)
- ENG4955 Concurrent Engineering and Project Data Management (1 credit)

* May be used to satisfy General Education Distribution Course Requirements if not required by major.

NOTE - Fulfillment of the minor requires a minimum of 6 credits at the 3000 level or higher which are not specifically required for a student's major, except as free electives. Total Requirements 20 credits

Enterprise Courses

Enterprise courses are designed to support your Enterprise Team work and also to help you look forward to your professional goals and endeavors. Below are brief course descriptions; additional information, including prerequisites, scheduling, and course offerings are available on the Student Records & Registration site.

ENG 2950 - Enterprise Orientation-Fall An orientation for students to their specific enterprise. Covers enterprise specific topics but should include organizational structure; past, present, and future projects and their results; an evaluation of learning and personality preferences; and exploring the MTU challenge course. Credits: 1.0

ENG 2960 - Enterprise Project Work I Interdisciplinary teams work as part of an engineering enterprise to address real-world engineering design projects or problems. Second- year students are responsible for achieving some prescribed objectives and performing critical analysis of data. Credits: 1.0

ENG 2961 - Teaming in the Enterprise Develops group problem-solving skills. Stresses interpersonal skills and skill assessment, communication, group process and teamwork, and action planning. Uses active, hands-on learning. Credits: 2.0

ENG 2962 - Communication Contexts An introduction to the demands of technical and professional communication in workplace settings, through analyzing project design team experiences. Credits: 1.0

ENG 2963 - Practical Electronic Circuit Design and Fabrication This is a hands-on laboratory course that focuses on practical implementation of electronic circuits, especially for students enrolled in the Enterprise Program. Topics include grounding, wiring, analog/digital circuits, power supplies, EMC, board layout/fab/test, soldering, safety and instrumentation. Credits: 1.0

ENG 3401/EC 3401 - Economic Decision Analysis I For students who want to take EC3400 in modules. Covers techniques for effective decision making related to the time value of money. Covers interest-rate calculations, loan repayments, and basic decision tools for comparing alternatives (present and annual worth, rate-of-return, etc.). Taught in the first five weeks of EC3400. Credits: 1.0

ENG 3402/EC 3402 - Economic Decision Analysis II For students who want to take EC3400 in modules. Deepens coverage of principles and techniques for making effective decisions by introducing benefit and cost estimation, depreciation and taxation, and project evaluation. Taught during the second five weeks of EC3400. Credits: 1.0 Lec-Rec-Lab: (3-0-0) Semesters Offered: Fall Spring Restrictions: May not be enrolled in one of the following Class(es): Freshman Sophomore Prerequisites: (EC 3401(C) or ENG 3401(C)) and UN 2002

ENG 3403/EC 3403 - Economic Decision Analysis III For students who want to take EC3400 in modules. Provides an understanding of the setting in which effective decisions are made. Covers business organization, financial statements, risk and uncertainty, project and business financing, and capital budgeting. Taught during the third five weeks of EC3400. Credits: 1.0

ENG 3950 - Enterprise Project Work II Interdisciplinary teams work as part of an engineering enterprise to address real-world engineering design projects or problems. Third-year students will practice designing approaches to solve problems and develop procedures to achieve specified project objectives. Credits: 1.0

ENG 3954 - Enterprise Market Principles Fundamental principles of marketing in a lecture format augmented by a simulation played in small groups. The course is completed in two day-long Saturday sessions separated by one week. Examines marketing in the six stages of product life cycle (opportunity identification, product development, introduction, growth, maturity, and decline). Credits: 1.0

ENG 3955 - Conceptual Design and Creative Problem Solving Students gain an understanding of the creative problem-solving process through application to a team design project. This module should be taken prior to students undertaking a major team project in their engineering enterprise or as E-teams (NCIIA). Credits: 1.0

ENG 3956 - Industrial Health and Safety Instruction of health and safety in engineering practice. Integrates the study of health and safety regulations, risks, and potential for improvement. Also covers the tremendous financial, ethical, and public relations implications of disregarding this critical aspect of engineering. Credits: 1.0

ENG 3957 - Product/Process Development I Course provides an overview of the major activities involved in developing a product or service which will satisfy the customer. Introduces major engineering tools used for team-based integrated product/process development (IPPD) such as project management, benchmarking, quality function deployment, process flow charting, cost analysis, and failure modes and effects analysis. Credits: 1.0

ENG 3958 - Ethics in Engineering Design and Implementation The focus of this course is on ethical considerations in the engineering design and implementation process. Basic ethical analysis tools will be explored through various exercises. Students will analyze and present life engineering ethics case studies. Credits: 1.0

ENG 3960 - Enterprise Project Work III Interdisciplinary teams work as part of an engineering enterprise to address real-world engineering design projects or problems. Third-year students practice designing approaches to solve problems and develop procedures to achieve specified project objectives. Credits: 1.0

ENG 3961 - Enterprise Strategic Leadership This 1-credit module focuses on exploring research findings about leadership, the practice of leadership, and providing skill assessment and development opportunities. Topics include leadership traits, behaviors, theories, and leadership of change. Combines a variety of teaching methods, including self-assessment, cases, discussion, experiential exercises, role-playing, videotaping. Credits: 1.0

ENG 3962 - Communication Strategies Drawing on the broad understanding of workplace communication developed in ENG2962, students will learn and practice strategies for effective oral and written communications in technical and professional settings. Emphasis is on audience adaptation of technical information and on achieving clearly specified purposes. Credits: 1.0

ENG 3963 - Enterprise Entrepreneurship This course emphasizes the financial, marketing, and technological challenges faced by entrepreneurs. The course will help the student learn how to

establish a business plan and assess opportunistic risk for new business ventures. Alternative product and/or process innovations can be evaluated and implemented. Credits: 1.0

ENG 3964 - Project Management Project definition, developing a work breakdown structure, responsibility assignment and milestone development. Covers techniques for project scheduling and practical application of Gannt and PERT/CPM charts; resource management and application of critical chain method; project budgeting and cost estimation; project monitoring, control, evaluation, and termination; and project teams, their structure, and interactions. Credits: 1.0

ENG 3965 - Material Flow in an Industrial Society Introduction to material flow, recycling, and pollution. Covers regulation of material flow and pollution; flow diagrams for specific industries, i.e., paper mill, power plant, steel, aluminum, cement, fertilizer; global warming components of basic industries; interdependence on basic industrial material flow from each other; and development of regional/national material flow diagrams. Credits: 1.0

ENG 3966 - Design for Manufacturing This course supplements courses that address "design for function." Products "designed for manufacturing" are lower cost, higher quality, and have a shorter time to market. The course describes how the capabilities and limitations of common manufacturing processes translate into qualitative design guidelines. Topics include design for casting, forging, sheet metal forming, machining, plastics and assembly. Credits: 1.0

ENG 3967 - Product/Process Development II This course provides an overview of the major activities involved in developing a product or service which will satisfy the customer. The course introduces major engineering tools used for team-based integrated product/process development (IPPD) such as cost-effective development of manufacturing processes including lean manufacturing, statistical process control, design of experiments, geometric dimensioning and tolerancing and poka-yoke (mistake proofing). Credits: 1.0

ENG 3968 - Manufacturing Processes and Simulation The focus of this course is on manufacturing techniques used in engineering practice. Covers an overview of classical manufacturing processes and the modeling of these processes by use of simulation software. Mass production assembly line systems as well as highly variable hand assembly systems and queuing theory will be discussed. Credits: 1.0

ENG 3969 - Project Phases of Design and Implementation The focus of this course is on the various project phases associated with the manufacture or construction of engineering design solutions. Roles, relationships and duties of various parties and their changing activities will be explored from an overall perspective of the management of the project. Credits: 1.0

ENG 3970 - Enterprise Special Topics For the development of new, junior-level instructional modules in support of the engineering enterprise. Credits: 1.0

ENG 3971 - Seven Habits of Highly Effective People Focuses on personal and professional effectiveness through greater productivity, increased influence in key relationships, stronger team unity and complete life balance. This course will explore these areas through interactive exercises, case studies, videos, and sharing of experiences. Credits: 1.0

ENG 4950 - Enterprise Project Work IV Interdisciplinary teams work as part of an engineering enterprise to address real-world engineering design projects or problems. Fourth- year students gain experience in defining project objectives, planning strategies to achieve these objectives, and leading technical teams to accomplish project goals. Credits: 2.0

ENG 4951 - Budgeting-Intrapreneurial Engineering Introduction to the mechanics and dynamics of the financial budgeting process. Emphasizes their use in planning and evaluating engineering projects and enterprises. Topics and activities include budget preparation, performance assessment, and emerging issues analysis. Credits: 1.0

ENG 4952 - Complex Communication Practices Students apply strategies and knowledge learned in ENG2962 and ENG3962 to the achievement of more complex communication practices demanded in technical and professional settings. Emphasizes creating professional identities, management communication skills, and responsible messages within teams and organizations and for a variety of technical and nontechnical audiences. Credits: 1.0

ENG 4954 - Global Competition Emphasizes unique economic, market, and political risks faced by organizations as operations expand beyond domestic borders. Discusses establishing risk profiles to analyze new labor, product, capital markets on a global scale and appropriate market entry strategies. Small teams will do a risk profile and recommend market entry strategies for selected countries. Credits: 1.0

ENG 4955 - Concurrent Engineering (or Fasttracking) and Project Data Management Concurrent engineering or "fasttracking" project delivery is when the product or project is designed while being built or manufactured. The advantages and disadvantages of concurrent engineering will be discussed. Credits: 1.0

ENG 4960 - Enterprise Project Work V Interdisciplinary teams work as part of an engineering enterprise to address real-world engineering design projects or problems. Fourth- year students gain experience defining project objectives, planning strategies to achieve these objectives, and leading technical teams to accomplish project goals. Credits: 2.0

ENG 4970 - Enterprise Special Topics For the development of new, senior-level instructional modules in support of the engineering enterprise. Credits: 1.0

Appendix II Grading, Assessment, and Evaluation

Examples:
Wireless Communication
Automotive Systems Engineering
Consumer Products Manufacturing
ITOxygen

Wireless Communication Enterprise Grading Policy

Advisor: Dave Stone
dstone@mtu.edu

Principle: Students grade each other and themselves. The faculty advisor makes the final call. The midterm performance review enhances communication between project managers and team members. This avoids surprises at the end of the term. The advisor will typically not look at the midterm reviews, but officers will identify any severe problem areas.
A formal evaluation is done at the end of the term. Each employee must have at least a self-eval, a Project Manager eval, and a peer eval. Project Managers do a self-eval and are evaluated by an officer. Officers do a self-eval and are evaluated by the President. The President does a self-eval only.

No 'backscratching' is allowed. If A peer-evals B, then B cannot peer-eval A. An employee can seek as many evals as desired. Additionally, any employee may choose to submit an eval on anyone else.

All evals are submitted directly by the evaluator to the President and VP – Operations (the top two officers). These officers collate and identify whether any evals are missing. The evals are organized into folders by team, alphabetized within each team, and submitted to the advisor.

The advisor analyzes each team's semester binder (that neatly organizes all the research done that term), engineering notebook, and semester final report. He determines a letter grade and critical comments for each team. This Word doc is distributed to all WCE employees as feedback.

Everyone sees the grade and comments for every team.

The advisor then reviews the evals for each employee/student. Each student's grade is determined by the evals as calibrated by the documentation. For example, if a member gets great evals, but his team gets a B, he's likely to get a B. The team grade is the highest an individual can earn. Also – we expect more from seniors, and just somewhat less from juniors and sophomores.

If there are apparent discrepancies in the eval review, the advisor may email the evaluators to get clarification

Big point: For this system to work, students must avoid inflation. They've got to be honest. Low grades for goldbricks are the only means to "fire" them from the Enterprise.

Automotive Systems Enterprise Grading Policy

Advisor: Jim Hertel
jehertel@mtu.edu

Grades will be given by the Advisor, with significant input from the officers and project leaders. Contributions need to be **documented.** Some factors that are considered for grading are as follows:

- Performance Evaluations and Self Evaluation Reports
- Role and contribution on development project (based on documents in personnel
- folder)
- Time/Activity Documentation (approximately 45 hours are required per credit)
- Contributions to ASE organization in areas such as:
    - computer technology
    - communication (posters, etc.)
    - finance / accounting
    - project management
    - craftsmanship / fabrication
    - leadership / organization

Some Final Points:

Companies hire engineers because they work hard and get the job done. The culture in ASE must be one of performance based on clear, realistic objectives. Enterprise is not like coursework where assignments are given —- your team's performace is the result of self-direction and self- motivation.

As in the real world, it is what you can create (and document) that will prove your worth. It is the advisor's job (in addition to giving grades) to help you get what you need to get it done.

Consumer Products Manufacturing
Enterprise Grading Policy

Advisor: Tony Rogers
tnrogers@mtu.edu

Grades will be broken down into seven categories.

Personal Objectives (20 points)
This involves filling out Excel spreadsheet (provided in an upcoming e-mail) and turning it in on time. Personal objectives will be derived from your team's objectives. You will submit a list of objectives to your team leader in class third week (January 29th). Your team leader can help you divide the 20 points among your objectives.

Update Memos (35 points)
As scheduled, each student will submit a brief (1-2 page) memo detailing his or her work done for CPM. These memos will be due per the schedule below. Each memo will be reviewed by members of the executive board and graded based on professionalism and content. Memos will be submitted to team leaders in both paper and electronic form. The grades on these memos will be scaled to be worth 35 points total.

The first memo will be a "pre mortem" assessment memo. Please detail your objectives for this semester and how they apply 1) to your team's objectives and 2) to any or all of the ABET (and departmental) criteria listed on the next page.

Attendance (5 points)
Attendance points will be assigned according to the number of Thursday meetings you attend. You lose one point for each unexcused absence after your first. To verify an excused absence (for university-approved reasons), contact Robert at rwsandov@mtu.edu by 1:00 on Thursday if you will be missing that week's class.

Peer Reviews (5 points)
At the middle and end of the semester, you will evaluate each of your team members. You receive five points for participating in this process.

Initiative/Volunteerism (10 points)
During the semester, you will encounter several opportunities outside class to support CPM, such as attendance at recruiting sessions, family weekend booths, and enterprise expositions. These events are generally in the evenings or on weekends. Other chances for initiative will be announced in class.

Class Goal (5 points)
Everyone will receive five points if we go over and above our expectations for this semester.

Grading Scale
100-90 A
89-87 AB
86-80 B
79-77 BC
76-70 C
69-67 CD
66-60 D
<60 F

Executive Review (20 points)
These 20 points will be assigned according to feedback from team leaders, K-C mentors, and our faculty advisor.

Midterm Grades will be calculated and distributed during eighth week of class. The report will include points earned to date and appropriate feedback to increase your score by the end of the semester. Midterm grades do not affect final grades in any way.

ITOxygen Enterprise Grading Policy

Advisor: Michael Moore
mmoore@mtu.edu

Grades are assigned by the Advisor, with substantial input from Team and Project Leaders. As in all professional organizations, however, always be sure to document your work, participation, and contributions. Keep in mind that one academic credit requires at least three hours of IT02 project participation each week – thus, approximately 42 hours per semester. It is your responsibility to document persuasively how you spend that 42 hours — or in the case of ENG4950/60, which is a two-unit designation, 84 hours.

You may choose to document your participation by attaching time sheets, progress reports, and other documentation that you've completed – or you might choose to attach examples of the work you've done: web sites, research reports, background reports, programming outcomes, screen shots etc. If your work and contributions included posters, multimedia, or other visually rich materials, feel free to be creative in your documentation presentation.

Project & Communication Grading and Evaluation Criteria

Successful Information Technology teams and organizations such as ours pay attention to several professional criteria:

- Commitment to problem-solving
- Understanding and practicing ethical behavior
- Demonstration of professional enthusiasm for projects and support for colleagues
- Commitment to consensus-seeking activities
- Practicing audience-based communication and design
- Exploring current trends and practices in technology and management practices
- Challenging ourselves to discover and to try alternative approaches to our work
- Taking responsibility for aligning our professional goals with those of the team
- Delivering the best possible products or consultation to our clients

These are the very basic criteria from which any meaningful and sustainable innovation can emerge.

Evaluation for enrolled ITOxygen members always focus on those professional criteria:

A The communication, design, or project is exceptional. This is the kind of project and team participation that might lead to promotions in the workplace and in other professional contexts. Team member takes initiative in developing, collaborating on, and completing projects.

- **Deliverables** are consistently well documented and on time.
- **Communication**: Team member promotes positive, collegial, and professional communication practices.

B The communication, design, or project is strong. It would be considered acceptable in the professional contexts.

- **Deliverables** are completed on time.

- **Communication**: Team member participates actively in team meetings and during project meetings

C The communication, design, or project is competent. It would probably be returned for revision or rethinking in professional contexts.

- **Deliverables** are inconsistent and do not regularly meet IT02 standards
- **Communication**: inconsistent

D The communication, design, or project is weak. It would probably get the designer or professional communicator into a bad situation in professional contexts.

- **Deliverables** are inconsistent or missing
- **Communication**: Team member does not participate or actively communicate with team members or project teams

F **Pink Slip**

Appendix III

Procedures for Proposing and Developing a New Enterprise Team

Procedures for Proposing and Developing a New Enterprise Team

New Enterprise Teams can be proposed and developed in consultation with the Enterprise Program Industrial Project Manager, Mary Raber:

725 Minerals & Materials
mraber@mtu.edu
487-2005

The procedure for proposing a new Enterprise Team begins with a formal Enterprise Proposal, delivered in this format:

Section 1: Development

- What type of business, organization, or service will the new Enterprise Team pursue? (1-2 paragraphs)
- What are the Enterprise Team's goals and objectives? (1-2 paragraphs)
- What possible sources of funding has the potential Team identified? (List of companies and organizations who could potentially fund the Team)

Section 2: Educational Component

- What will MTU students learn by being part of the new Enterprise team? (2-3 paragraphs)
- How will students' learning outcomes be measured? (1-2 paragraphs)
- From what disciplines will students come to join the new Enterprise Team?
- What is the ideal number of students to begin the new Enterprise Team?

Section 3: Finances

- Include preliminary operational budget for one year
- Discuss possible departmental or unit support for the proposed new Enterprise Team (1-2 paragraphs)

Section 4: Computing and Space Considerations

- Discuss both first-year and long-term computing needs and office/workspace needs (2-3 paragraphs)

Appendix IV

COE Shop Procedures 2004-05

Contents

2003 COE Shop Procedures

The information in this booklet is intended as general safety and shop use guidelines. Any operation not covered in this text should be performed in accordance with the following standards:

- MIOSHA www.cis.state.mi.us/bsr/
- NFPA (National Fire Protection Association) www.nfpa.org
- If you have any questions, please ask a staff member or contact the MTU Occupational Safety and Health Services office at 7-2118.
- The MTU safety manual is accessible from the MTU web page: http://www.sas.it.mtu.edu/fm/oshs/

Team leaders are responsible for ensuring that MSDS sheets are obtained and properly filed for materials purchased by the team. Signs posted throughout the shop areas must be observed.

Enterprise Advisor Safety Responsibilities

The Advisor is ultimately responsible for all aspects of student safety during all activities related to their individual Enterprise.
Although the machine shop is supervised by shop staff and procedures have been established, it is possible for a project to involve unforeseen activities. Many teams have labs unrelated or in remote locations from the established fabrication areas. It is the advisors responsibility when necessary to seek assistance from OSHS, or shop staff in establishing a safety procedure for a given activity.

An advisor must:

- Be aware of what activities his/her students are engaged in.
- Consider safety before allowing a given activity to take place.
- Ensure safety procedures are in place for the given activity.
- Ensure students are properly trained for the given activity, and are aware of the established safety procedures.
- Maintain documentation that training has taken place for each student involved in a given activity.
- Be sure students are supervised by qualified personnel in areas not directly supervised by shop staff. (When necessary)
- Enforce established safety rules and procedures.

Emergency Procedures

Injuries

- All injuries (including minor) must be reported immediately to a staff member.
- The campus emergency phone number is 123.

Fire

- Pull the nearest fire alarm.
- Leave the building.
- Call 123 from a safe location and give clear directions to the fire.
- Do not re-enter the building until the "all clear" is given by public safety.

Hazard Communication

- MSDS sheets for the machine shop are located next to the office door.

Spills/Leaks

- Report any flammable liquid spills to shop staff immediately, or call public safety at 123.
- All spills must be cleaned up immediately.
- Do not allow any liquid other than water to enter the floor drains.
- Floor dry, rags, or other clean-up materials must be disposed of properly (see pages 11 and 12). Do not throw these materials in the general trash.

Shop Orientation and Training Procedure

- Shop staff will provide orientation for team advisers and student leaders. This will cover the safety and operating procedures outlined in this text. Team advisers and leaders will provide the equivalent orientation to all team members wishing to use the shop areas.
- Students who have completed orientation will sign a checklist verifying they understand the shop safety and operating procedures. A current list and photos of qualified team members will be sent to the shop staff.
- Students wishing to use the machine shop must check in with shop staff. Drawings signed by the team advisor or appointed team member, are required for machine shop equipment use.
- Students will be required to take a written test for each type of machinery used. A training structure has been developed and will be phased in during this school year.

Major Shop Hazards

Cuts, Abrasions

- Sharp edges on stock or workpiece
- Cutting tools
- Pinch points
- Chips from machining operations

Burns

- Hot materials and workpiece from welding, torch cutting and heat-treat operations
- Welding radiation (similar to sunburn)
- Electric shock

Eye Injuries

- Welding rays
- Chips from machining operations, broken tools
- Chemicals splashed in eyes, chemical fumes

Chemicals

- Skin and eye contact
- Inhalation of toxic fumes
- Explosion/fire

Slip and Fall Accidents

- Coolant and oil spills
- Air hoses - cords - welding cables - cluttered work area

General Shop Safety

- Always wear your safety glasses with side shields unless you are wearing more protective eye protection. Safety glasses must always be worn under a full face shield or welding helmet.
- No children are allowed in the shop for any reason.
- Visitors are not permitted to work in the shop facilities.
- Do not enter the shop if you are under the influence of alcohol or any type of drugs (including some prescription and over the counter drugs).
- Report all injuries, close calls, or unsafe conditions immediately. Shop staff must fill out a Supervisors Incident and Injury Investigation Report.
- Practice good housekeeping. Keep floors free of trip and slip hazards. Keep workbenches free of clutter and properly store tools. Do not allow chips to pile up on machinery. Stop the machine and remove chips with a brush, not with an air hose or your hands.
- Do not operate equipment without permission.
- Never attempt to repair machinery. Ask shop staff for assistance.
- Do not remove machine guards or operate machinery without all guarding in place.
- Do not use an air hose to clean yourself or machinery.
- Never leave a machine that is in operation.

Proper Dress

The following items should NOT be worn in the shop areas except within the marked aisles:

- Loose clothing, jackets, long sleeves (except when welding)
- Rings, watches, bracelets
- Neck ties and necklaces should be tucked inside your shirt
- Headphones
- Sandals
- Shorts
- Nylon or synthetic clothing which can burn or melt

Long hair must be secured in a hat or net .

Personal Protective Equipment

Eye Protection

- Safety glasses must comply with ANSI Z87.1-1989 and be worn at all times in both the assembly and machine shops, unless more protective eyewear is worn (for example goggles). Glasses worn on top of the head will be considered not wearing eye protection.
- Safety glasses must be worn under welding helmets and full-face shields.
- Prescription eyeglass wearers should wear Z87-1 goggles over non-Z87-1 prescription glasses.

Face Protection

- Face protection should be worn over safety glasses during certain operations.

Foot Protection

- Leather shoes should be worn, and fully enclose the foot.

Hand Protection

- Leather gloves should be worn for all welding operations.
- Proper gloves should be worn when handling chemicals. (Refer to MSDS)
- Gloves should not be worn during machining operations.

Hair Enclosures

- A hat, cap, or net shall be used by a person where there is a danger of hair entanglement in moving machinery or equipment, or where there is exposure to means of ignition.

Respirators

- Respirator or dust mask use requires the prior approval of OSHS.

Organization/Cleanliness

- Aisles must not be blocked or used for workspace at any time, as they are required for emergency exits and safe travel through the shop areas. Workbenches should be set back sufficiently to allow space for stools without placing the stools in the aisle. Materials must not protrude into the aisles. This applies during normal and after hours use.
- Access to fire extinguishers, eye wash stations, or electrical panels must not be blocked or hindered in any way.
- Floors must be kept free of clutter.
- Benches should be cleaned off and tools properly stored daily.
- Machine shop equipment must be cleaned up after each use. Remove cutters and use a brush to remove chips.
- Sweep the floor around equipment that you have used.
- Sinks are for hand washing only; do not clean parts in the sinks.
- Spills should be cleaned up immediately. Leaking vehicles should be repaired promptly. Floor dry must be swept up daily.

Access

- A shop staff person must be present during machine shop use.
- Between 5:00 P.M. and 8:00 A.M. access is limited to official Enterprise Space (machine shop, assembly shop, and Enterprise office space). All other areas of the building, except corridors, elevators, and restrooms, are off limits.

Personal Projects

- Work on personal projects is strictly forbidden

Facilities

Students are NOT permitted to alter the facilities in any way. This includes but is not limited to:

- Tampering with any electrical, plumbing or other building utilities
- Painting or otherwise marking any part of the facilities
- Fastening any object to the building

Parking

- Refer to student handbook for parking regulations.
- No personal vehicles are allowed in the building.
- Repair of personal vehicles is not allowed except as stated in the student handbook.
- Do not block the overhead doors.

Loading Dock

The area near the overhead door in the assembly shop is the loading dock for the building. Items left unattended will be removed or disposed of. NO PARKING is permitted in this area. Vehicles left in this area will be removed or towed at the expense of the team/owner with no further warning.

Assembly Shop Equipment

- Any equipment brought into the assembly shop area must receive prior approval from the shop staff.
- Teams are expected to properly maintain equipment in the assembly shop. A file should be kept with manuals, safety instructions and maintenance records for all tools and equipment owned by each team.
- Students are not permitted to operate the forklift or overhead cranes.
- All grinders, welders, torches, or any item requiring a hot work permit must be stored in the machine shop. These items may be signed out when a hot work permit is issued.
- Shop staff must have access at all times to any cabinets etc. Keys or location of keys must be given to shop staff. In the event access is needed and keys are not available shop staff reserves the right to remove the lock.

Waste Disposal

The following items have special disposal procedures and do not go into the general trash. Please ask shop staff for assistance with these items:

- Liquids
- Waste rags
- Electronics
- Solid metals
- Batteries
- Tires

Oils which can go in the waste oil barrel include:

- Oils with a flash point greater than 120 degrees F
- Motor oil
- Diesel fuel
- Kerosene
- Brake fluid
- Power steering fluid
- Transmission fluid
- Lubricants (Non silicon)

The following liquids do not belong in the waste oil barrel. They must be kept in separate sealed and marked containers. An area is designated near the overhead door in room 109 for these to be picked up by OSHS. Markings should include contents, team, and date; an MSDS sheet must also be available.

- Any liquid other than motor oil, kerosene, or diesel fuel with a flash point less than 140 degrees F
- Gasoline
- Solvents
- Thinners
- Anti-freeze
- Silicon lubricants
- Oil rags should be disposed of in the oil rag can

All waste products must be properly labeled and contained. Open containers or pans of oils, etc. will be disposed of as hazardous waste. Teams will be charged for the disposal.

Flammables

Any transferring of gasoline or flammables must be done outside.

- Flammable liquids, aerosol cans, etc. must be stored in a flammable liquid cabinet in closed containers.
- Gasoline, paint thinner, etc. is not to be used as a fluid for washing parts.
- Gasoline must be stored in a FM or UL approved steel safety can. Vehicle tanks may contain fuel under the following conditions:
- Tank must be properly capped (tin foil or rags are not proper caps).
- Tank and fuel system must be leak free.
- Any disconnected lines must be sealed with the proper fittings. (Spark plugs etc. are not proper fittings.)
- Any tanks removed from vehicles must be stored empty.

Improperly stored fuel will be disposed of as hazardous waste at the expense of the teams.
Tires are considered flammable. No storage of tires is permitted.

Hot Work Permit

Any operations which generate heat, sparks or open flames must be performed in the machine shop welding area, or a shop staff person must be contacted for a hot work permit. This includes but is not limited to:

- Welding
- Torch cutting
- Soldering
- Brazing
- Grinding

No permits will be issued if any area in the shop is in violation of shop rules regarding storage of flammables or NFPA standards.

Engines

- Engine exhaust must be vented outside; the air handler is not a sufficient means of removing vehicle exhaust.
- Engines need to have a muffler attached before operating.

Paint/Fumes/Dust

Spray painting facilities do not exist. All painting must be by brush or roller except for the use of small spray cans on parts no larger than will fit in a shoebox.

- No painting is allowed in the machine shop.
- The use of any product creating flammable or otherwise hazardous dust or fumes must receive prior approval of shop staff.

Electrical

- Projects requiring electrical wiring must be reviewed by a qualified electrical inspector prior to being plugged into university power.

- Students are not permitted to perform any building electrical work. This includes but is not limited to changing fuses, resetting circuit breakers, or opening electrical panels for any reason.

Radios

- Radios are not permitted in the machine shop.
- Radios in the assembly shop must be kept at a volume that does not disturb others, and when asked, must be turned down or off.

Food

- Refrigerators, microwaves, coffeepots, etc. are not permitted in the shop areas. These items belong in the second floor break room.
- No food may be stored in the shop areas
- Barbecue grills are not permitted in the building for any reason.

Disciplinary Procedure

Discipline for failure to follow safety or operating procedures covered in this text is divided into two categories; individual issues and team issues.

Individual issues

These are issues involving a specific person whom has violated a safety or operating procedure. These would be issues such as; not wearing safety glasses, removing machine guarding etc.

- Discipline for individual violations ranges from immediate removal from the shop for the remainder of the day, to permanent loss of shop privileges. Any individual issues covered by University policy in the student handbook will be referred to the Dean of Student affairs.
- First offense- a written formal warning will be given with a copy sent to the advisor. Certain issues such improper dress or failure to wear safety glasses will result in removal from the shop for the remainder of that day.
- Second offense- Student will be asked to leave the shop until the advisor is contacted by shop staff. A decision will be made between shop staff and the advisor as to when that person will be allowed back into the shop areas.
- Third offense- Will result in permanent loss of shop privileges.

Team issues

These are issues involving a team which has violated a safety or operating procedure. Most of these types of issues are housekeeping and storage related, such as; Oil spills on the floor not cleaned-up, leaking gasoline, improper storage of flammables etc.

Discipline for team violations is in the form of monetary fines.

- First offense- Shop staff will contact team leader, and advisor. Issues creating an immediate hazard will be handled by shop staff using whatever means necessary. This may include moving items outside, or disposing of them. Teams will be given two days to resolve issues not posing an immediate hazard. If these are not resolved within this time period they automatically become a second offense.
- Second offense- Shop staff will contact team leader, advisor and Enterprise governing board. Team will be fined according to the degree of violation. Fine amount will be set by Governing board. Money collected from fines will be used to purchase safety related items for the shop. This would include items such as flammable storage cabinets, etc.
- Further offenses- fines will double each time the same violation reoccurs.

COE Shop Orientation Checklist

- ☐ Emergency Procedures
- ☐ Shop Orientation and Training Procedure
- ☐ Major Shop Hazards
- ☐ General Shop Safety
- ☐ Proper Dress
- ☐ Personal Protective Equipment
- ☐ Organization/Cleanliness
- ☐ Access
- ☐ Facilities
- ☐ Parking
- ☐ Loading Dock
- ☐ Assembly Shop Equipment
- ☐ Waste Disposal
- ☐ Flammables
- ☐ Hot Work Permit
- ☐ Engines
- ☐ Paint/Fumes/Dust
- ☐ Electrical
- ☐ Radios
- ☐ Food
- ☐ Disciplinary action

The Shop Safety and Operating Procedures Handout has been presented to me by:

_____

Signature of Team Adviser/Leader

I have read and understand the handout and agree to follow the procedures contained therein. I understand that failure to follow these rules and procedures may result in disciplinary action up to and including permanent loss of access to the machine shop and fabrication areas.

_____	_____	_____
Name (Print)	Signature	Date

Operations Manual Revision History

10/10/04: Team-member enrollment status revised
10/04/04: Partners and logos updated
9/29/04: Student Advisory Board Review
9/27/04: Faculty Incentive section revised
9/10/04: New MTU WWW Guidelines added
9/01/04: Submitted to Enterprise Governing Board for approval (approved 9/06/04)
8/29/04: Faculty Advisors Meeting input
8/15/05: COE Shop Procedures added
7/22/04: Student Advisory Board input
Summer 2004: Draft