1. MISSION AND DEGREE

1.1 Describe how the program relates to UW-Stout's Mission and Goals.

The Engineering Technology (ET) Program is very closely aligned with the special mission of the Stout campus within the University of Wisconsin system. The ET program has adopted a mission based directly on the campus mission and emphasizes the combination of theory, practice and experimentation as the preferred method of instruction, development of graduates prepared for entry level professional careers, and the use of continuous quality improvement.

The UW-Stout mission statement is given as:

_University of Wisconsin-Stout, as a special mission institution, serves a unique role in the University of Wisconsin System. UW-Stout is characterized by a distinctive array of programs leading to professional careers focused on the needs of society. These programs are presented through an approach to learning which involves combining theory, practice and experimentation. Extending this special mission into the future requires that instruction, research and public service programs be adapted and modified as the needs of society change._

The ET program mission that was adopted in Spring 2003 by the program advisory board is stated as:

_The UW-Stout Engineering Technology Program prepares graduates for professional careers in mechanical design, manufacturing, sales, facilities, plastics, operations, nano-technology, electrical, computer, and biomedical engineering. The hands on approach to learning which involves combining theory, practice and experimentation trains program graduates to apply sound engineering and management principles to industrial problems. The program utilizes continuous quality improvement to adapt to changing technologies, needs of our students, and a society._

The underline is used here to demonstrate key points of alignment with the campus mission.

2. DESCRIPTION OF THE PROGRAM

2.1 Curriculum Design

The engineering technology program focuses on the application of engineering and scientific concepts to manufacturing related industries. A broad technical core stresses applied laboratory experiences coupled with theory and examples provided by staff with industrial experience in their specialized fields. The strong professional studies area provides the foundations for those seeking a future management career track.
The six concentrations are: mechanical design, electrical, plastics, production operations, facilities, and nanotechnology. There are eight core courses for students enrolled in the electrical concentration that provide a well-rounded electrical application background. Because of similar career needs, all other engineering technology students take about eight of the same core classes. The remainder of their core courses are specific to each concentration. The eight core courses include studies in electricity, hydraulics, engineering graphics, plastics, metal joining, fabrication, casting, and machining.

The mechanical design students complete several additional mechanics courses in strength of materials, statics, dynamics, and other mechanisms.

Plastics students take similar courses to mechanical design, but switch four mechanical courses with chemistry of polymers and three plastics processing courses.

The nanotechnology concentration is also mechanical design based, and similar to plastics, these students take four NANO course offered in the Chemistry Department.

Facilities and production operations are engineering technology’s management based concentrations. Production operations students study lean manufacturing, quality, and other productivity courses. Facilities students take AEC courses taught by the BS construction management instructors.

As mentions earlier, the electrical concentration is mostly electrical and computer science courses.

2.1.1 State the program objectives.

Objectives 1-9 are goals we have for graduates to achieve within the first 3-5 years of professional practice as a result of the learning experience while in the program. The engineering technology program strives to produce technology graduates that will:

1. apply mathematics to the solution of engineering and manufacturing problems
2. plan and execute experiments, and to use data to improve products and/or processes
3. identify, formulate, model, and solve engineering problems
4. function effectively on teams
5. participate as an active professional, engaging in: lifelong learning, ethical conduct, respect for diversity, quality, continuous improvement, knowledge of global issues
6. use of contemporary computer tools found in industrial practice relevant to their concentration
7. communicate through written and oral means with a full range of diverse personnel
8. have developed a broad understanding of business operations and management functions that support a manufacturing company
9. have a basic understanding of manufacturing processes and associated technologies

In addition to the overall objectives, the program defines expected learning outcomes (or skill sets that all program graduates will have before graduation). Each concentration adds specific outcomes expected in the concentration area.
All Engineering Technology (ET) program graduates will:

1. Have demonstrated competency in the application of mathematics to the solution of engineering and manufacturing problems,
2. Have planned and executed experiments, and utilized the data to identify potential improvements to products and/or processes,
3. Have demonstrated the ability to identify, formulate, model, and solve engineering problems,
4. Have demonstrated the ability to function effectively on teams,
5. Have been exposed to definitions of professional expectations: including: lifelong learning, ethical conduct, respect for diversity, quality, continuous improvement, global issues,
6. Have experience in the use of contemporary computer tools found in industrial practice relevant to their concentration,
7. Have demonstrated competence in communication through written and oral means with a full range of diverse personnel,
8. Have demonstrated a basic understanding of: risk control, production operations, accounting, marketing, and leadership,
9. Have demonstrated a basic understanding of the technologies utilized in their respective fields.

All engineering technology program Mechanical Design concentration graduates will have demonstrated introductory level competency in:

10. statics, dynamics, strength of materials,
11. industrial level documentation of mechanical components and assemblies,
12. three dimensional computer modeling and simulation of mechanical components and assemblies,
13. synthesis, analysis, computer modeling and prototyping of specific motion producing mechanical linkages,
14. development and experimentation with three dimensional prototypes of complex mechanical systems, and
15. synthesis and implementation of automatic controls for mechanical systems.

All engineering technology program Plastics concentration graduates will have demonstrated introductory level competency in:

10. injection molding processes and tooling design,
11. computer simulation of polymer flow characteristics,
12. polymer processing and tool design, testing procedures and selection criteria,
13. statics and strength of materials,
14. industrial level documentation of mechanical components and assemblies, and
15. three dimensional computer modeling of mechanical systems

All engineering technology program Facilities concentration graduates will have demonstrated introductory level competency in:

10. economic justification principles,
11. planning of facilities,
12. management and scheduling of maintenance processes,
13. project management,
14. interpretation of documentation of building plans and codes,
15. interpretation of typical building contract specifications and requirements,
16. interpretation of heating ventilation and air conditioning system selection and analysis,
17. interpretation of plumbing electrical and illumination systems selection, and
18. chemistry as related to environmental pollution control.

All engineering technology program Production Operations concentration graduates will have demonstrated introductory level competency in:

10. quality management control processes and procedures,
11. economic justification principles,
12. production and inventory control practices,
13. planning of facilities,
14. logistics, and
15. purchasing practices

All engineering technology program Electrical concentration graduates will have demonstrated introductory level competency in:

10. electrical circuit analysis,
11. digital logic,
12. computer program design, development, and implementation,
13. microprocessor application and programming,
14. controls and Instrumentation,

All engineering technology program Nano-technology concentration graduates will have demonstrated introductory level competency in:

10. material properties at the nanometer scale,
11. structures comprised of nano scale components,
12. the broad spectrum of nanotechnology applications,
13. characterization methods of nano-materials,
14. methods of fabrication used for nano-materials

2.1.2 List the indicators that are monitored to determine the need for program revision, including but not limited to program enrollment, student retention or student graduation rates.

Industrial Advisory Board (reviews program plans, sponsor capstone projects)
Previous report recommendations and accomplishments (review for application)
Enrollments (needs, areas of interest)
Job placement (hiring trends, locating new employers, contacts for advisory committee)
Cooperative Education employer’s evaluations (student strengths, weaknesses)
Capstone projects (industry driven trends, sponsor and staff evaluations)
ABET-TAC criteria (current criteria)
Survey of graduating seniors (skills acquired)
Survey of current students (course evaluations)
2.1.3 What distance educational opportunities are provided in your program? Does the UWSA "Distance Education Standards for Academic and Student Support Services" apply to your program? If so, what evidence of educational effectiveness exists for these experiences? What does this evidence show?

Several management and general education courses are offered on line. The core courses for engineering technology are not offered on line because of the lab based learning activities required in all concentrations. In 2009 an articulation agreement was approved between UW Stout and Northcentral Technical College (NTC) in Wausau, WI. Students who complete an AAS in mechanical design at NTC will have 52 UW Stout credits towards a BS engineering technology degree. There is one full time UW Stout faculty on the NTC campus. His responsibilities include instruction, recruiting, and advising.

2.1.4 Give examples and explain the ways in which the program committee functions and contributes to the program.

The program committee meets once per semester. During this meeting an update of program quality measures is provided to the committee. The program director identifies any possible opportunities for program improvements. The committee provides alternate viewpoints, discussion, and ultimately votes as to whether any program changes are to be pursued. The program committee also helps to identify new trends in industry that may need to be addressed in the program curriculum. Additionally, some industrial program committee members may sponsor coop students, and/or capstone projects for program students. More recent examples of program committee activities may be observed in the minutes, attached in the appendix of this report.

The advisory committee is comprised of professionals in the field who are experienced in the mechanical design concentration. Informal committees exist to address the needs of the smaller concentrations. For example, The ETPD has attended the Plastics Engineering advisory committee meetings and takes into consideration the needs of this industry for application to the Plastics ET concentration.

Another example of an informal committee is the relationship between the student chapter of the Association for Facilities Engineers (AFE) with the MPLS/St Paul and West Central Wisconsin chapters of the AFE. The ETPD, Facilities coordinator, and several students occasionally attend AFE conferences and meetings. One recent decision involves the facilities program plan sheet be reviewed by several active AFE members for recommendations on improvements. Their recommendations will be addressed at a future meeting in the SP 11 semester.

2.1.5 UW-Stout “programs are presented through an approach to learning which involves combining theory, practice and experimentation” (Mission Statement). Briefly describe the components of your program where students participate in scholarly activity including research, scholarship, development and creative endeavor.

Most program courses require research in engineering subjects. Several examples are included below. A guest lecturer from the library teaches students in RD 100, Introduction to Engineering Technology, research techniques. Their assignment
requires researching one of the ET concentrations and finding articles specific to that discipline. A written report with bibliography is submitted. Students in the required course, RD 205, Design for Industry, complete several research assignments/projects in this problem solving class. Grading includes product function and design, creativity, and form. The most comprehensive research is conducted in MECH 337, the capstone course. Students choose a topic presented by the instructors or they may find one on their own. Many hours are spent each semester by teams of 3-6 senior students researching and identifying solutions for their topic.

In addition to formal classroom work student organizations promote scholarly activities. A recent Society of Manufacturing Engineers (SME) contest involved engineering technology students designing a remote controlled lunar vehicle for a national SME competition. An engineering technology student was in the news last year as a repeat “Battlebot” national champion. The Society of Automotive Engineers (SAE) Baja division is popular among students. All four Baja cars are designed, manufactured, repaired, and driven by UW Stout students, many are engineering technology students. The SAE Baja car is arguably the most career related organization on campus for engineering technology mechanical design students as it represents the concentration’s wide variety of career paths.

2.1.6 Does your program currently have an accreditation or certification agency that reviews the program? If so, which agency and to what extent do they influence the structure of the curriculum?

Engineering technology is not accredited, but is in the beginning stages of planning a strategy and laying ground work for ABET-TAC accreditation. Six new concentrations were added in 2006 for a total of ten. The new concentrations are: nanotechnology, electric, industrial, supply chain, biomedical instrumentation, and computer. The initial investigation into ABET-TAC accreditation revealed several concentrations should be eliminated. The cost/benefit ratio based on the limited student population for accreditation was excessive. This resulted in eliminating registration in four concentrations effective the fall 2010 semester. The four concentrations are industrial, supply chain, computer, and biomedical instrumentation.

The ABET-TAC accreditation agency influences the curriculum to the extent of requiring certain expected learning outcomes for graduates that are consistent with the industrial perception of BSET graduates. The current engineering technology program does not differ substantially from ABET-TAC requirements. The requirements include students, program educational objectives, student outcomes, continuous improvement, curriculum, faculty, facilities, and institutional support. University of Wisconsin-Stout and the STEM College have similar requirements in place. The thrust in accreditation is to provide the documentation proving the engineering technology program meets the requirements.

Current requirements are not as credit hour specific as in the past. For example, the technical content requirement is: “The technical content must develop the skills and knowledge appropriate to the educational objectives of the program and must represent at least 1/3 of the total credit hours for the program, but no more than 2/3 the total credit
hours for the program. All concentrations require fifty core credit hours, forty-one credit hours is the ABET-TAC minimum.

2.2 Faculty/Academic Staff Expertise

2.2.1 List the key people in the curriculum. A key instructor is one who teaches at least one required professional course in your program.

**Professional Studies (required for all concentrations)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD-100</td>
<td>John R. Schultz</td>
</tr>
<tr>
<td>MFGT-150</td>
<td>Rajiv Asthana/Glenn Bushendorf/Derek Wissmiller</td>
</tr>
<tr>
<td>RD-205</td>
<td>Brenda Puck/Thomas Kaufmann</td>
</tr>
<tr>
<td>RC-381</td>
<td>Brian Finder/Elbert Sorrell</td>
</tr>
<tr>
<td>INMGT-200</td>
<td>William Kemp/Michael Galloy/Xuedong Ding</td>
</tr>
<tr>
<td>INMGT-400</td>
<td>William Burmesch/Mary McManus/Sally Dresdow</td>
</tr>
<tr>
<td>BUACT-200</td>
<td>Charles Baird</td>
</tr>
<tr>
<td>BUMKG-330</td>
<td>Kevin McDonald/Dennis VandenBloomen</td>
</tr>
<tr>
<td>ENGL-415</td>
<td>Leslie Bowen/Quan Zhou</td>
</tr>
</tbody>
</table>

**Concentrations:**

**Mechanical Design**

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFGT-251</td>
<td>Adam Kramschuster/Wendy Stary</td>
</tr>
<tr>
<td>MFGT-252</td>
<td>Thomas Kaufmann/Glenn Bushendorf</td>
</tr>
<tr>
<td>MFGT-253</td>
<td>Gregory Slupe/John Petro</td>
</tr>
<tr>
<td>ELEC-204</td>
<td>Thomas Slupe</td>
</tr>
<tr>
<td>ELEC 341</td>
<td>Cheng Liu</td>
</tr>
<tr>
<td>POWER-260</td>
<td>Charles Groepper</td>
</tr>
<tr>
<td>ENGGR-112</td>
<td>Ron Scozzari/Nancy Schofield</td>
</tr>
<tr>
<td>ENGGR-210</td>
<td>Jerry Roiter/Ron Scozzari</td>
</tr>
<tr>
<td>ENGGR-280</td>
<td>Jerry Roiter</td>
</tr>
<tr>
<td>MECH-290</td>
<td>Derek Wissmiller/Ronald Thomas</td>
</tr>
<tr>
<td>MECH 291</td>
<td>Wendy Stary</td>
</tr>
<tr>
<td>MECH-332</td>
<td>John Petro/Ronald Thomas</td>
</tr>
<tr>
<td>MECH-337</td>
<td>Scott Springer/Lin Stradins/Ron Thomas</td>
</tr>
<tr>
<td>MECH-393</td>
<td>Scott Springer</td>
</tr>
<tr>
<td>RD-320</td>
<td>Scott Springer</td>
</tr>
<tr>
<td>RD-420/421</td>
<td>Chuck Groepper</td>
</tr>
<tr>
<td>MECH 437</td>
<td>Scott Springer</td>
</tr>
</tbody>
</table>

**Plastics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFGT-341</td>
<td>Jerry Wickman</td>
</tr>
<tr>
<td>MFGT-342</td>
<td>John R. Schultz</td>
</tr>
<tr>
<td>MFGT-343</td>
<td>John R. Schultz</td>
</tr>
<tr>
<td>CHEM-325</td>
<td>Jonathan Frisch</td>
</tr>
</tbody>
</table>
Facilities

INMGT-300  Ned Weckmueller/Leonard Pederson/Jon Hove
INMGT-350  Thomas Lacksonen
INMGT-450  Michael Galloy
INMGT-365  Diane Olson
AEC-237    Glendali Rodriguez
AEC-438    Joseph Wright
AEC-452    Richard Krohn
AEC-453    Richard Krohn
CHEM-353   Marty Ondrus

Production Operations

INMGT-120  Leonard Pederson
INMGT-300  Ned Weckmueller/Leonard Pederson/Jon Hove
INMGT-305  William Kemp
INMGT-314  Ned Weckmueller/Thomas Harvey
INMGT-320  Ned Weckmueller/Xuedong Ding
INMGT-350  Thomas Lacksonen
BUMKG-438  Gene Gutman
BUMKG-337  Gene Gutman

Nanotechnology

NANO 101  Marlann Patterson
NANO 301  John Kirk, Todd Zimmerman
NANO 330  John Kirk
NANO 401  Forrest Schultz
NANO XXX  Currently independent study, various instructors

Electrical

ELEC 260  Ahmet Turkmen
ELEC 271  Ahmet Turkmen
ELEC 272  Robert Nelson
ELEC 274  Robert Nelson
ELEC 340  Ahmet Turkmen
ELEC 382  Robert Nelson
ELEC XXX (CAPSTONE)  Robert Nelson, Ahmet Turkmen, Norm Zhou
CS 144    Wan Bae, Terrence Mason
CS 145    Dennis Schmidt
CS 244    Terrence Mason, Amitava Karmaker
MATH 154  Chris Bendel, Benjamin Jones

2.2.2 What additional areas of faculty/academic staff expertise are currently needed?

It is evident from recent student communications and roster information on student class level for many of the Engineering and Technology department courses that a backlog
exists now and is growing. This backlog prevents students from registering for sophomore level courses until they are junior and more commonly senior level. Particular courses with high backlogs include: POWER 260, ENGGR 210, and MFGT 253. Additional conflicts are caused when sophomore classes are scheduled at the same time as senior class periods. Changing the schedule does not help as approximately equal numbers are eliminated or allowed in.

A large concern is the lack of instructors in the electrical studies. This applies to mechanical design, and also the electrical concentrations. There is a like concern among the computer engineering instructors. Engineering technology and computer engineering require staff with a similar education and experiences. The electrical concentration is the second largest in ET, is only four years old, but is in jeopardy for lack of teachers. It should be noted that there needs to be more ET electrical students, yet staffing for two degrees is already an issue. The Engineering and Technology Department has made a commitment to support the electrical concentration.

ET is in the planning stage for accreditation. The Program Director attended an ABET training session in November, 2010 and will be working with the Engineering and Technology Department to coordinate accreditation in conjunction with the three engineering programs. To date, a timeline for accreditation has not been established.

Of concern as engineering technology seeks ABET accreditation is the current level of faculty and staff assigned to support the ET program. Engineering and Technology Department instructors teach courses for manufacturing, computer, and plastics engineering as well as ET. Although several of the same courses are required by engineering technology, manufacturing engineering, and plastics engineering, there are no engineering technology specific instructors. The computer engineering faculty (5 persons) and the plastics engineering faculty (3 persons) are able to distribute the accreditation work between them. The ETPD is an army of one, with realistically six BS Engineering Technology degree programs seeking accreditation. The Engineering and Technology Department will assist, but the work load is frankly, scary.

In order to establish a coherent faculty base of instructors primarily responsible for this program, new hires and/or reassignments are necessary. A coherent faculty base is necessary to achieve ABET accreditation. Recent retirements and assignments as program directors involving the ENGGR instructors will have negative impacts in the short run. (Jerry Roiter will retire after the FA11 semester and Ron Scozarri was appointed the BS Sustainability PD in November 2010.) The department is finalizing job search applications for three positions. This isn’t enough to meet all the needs as one position is replacing a retiree and the second a faculty member who left after one year.

2.3 Facilities

2.3.1 What special facilities and or capital equipment currently available are utilized and how do they strengthen this program? What additional facilities (special classrooms, labs, additional space involving minor construction) have been requested and has that been filled?
This question is like the double edged sword. On one edge, the classrooms and labs provide a positive environment for learning. They’re comfortable and some equipment has been updated recently in several labs. Recent upgrades in the plastics lab will benefit ET students, particularly those in the plastics concentration. The same logic applies to improvements in the computer engineering or electrical labs. Unfortunately, the need is great and the funding is small.

That’s the opposite edge of the sword. Procurement of current technology equipment is not like purchasing equipment in manufacturing. If cost justifications are made, the equipment is purchased. This isn’t the case in education, our equipment doesn’t generate income on a 24/7 basis.

There are still so many needs that are potentially stumbling blocks to maintaining cutting edge technology and in particular, recruitment. High school visitors aren’t “wowed” as many have similar or better facilities and equipment now. The departmental budget is consumed purchasing teaching stations, chairs, tables, etc. That was one of the biggest surprises as a new teacher.

A small item example in the machining lab is the vernier caliper, a hand tool used for precision measurements. Verniers haven’t been used since the 1970’s. Digital calipers are common today, and calipers that send readings to a remote computer for data recording aren’t rare.

New tensile, torsion, and hardness testers have recently been purchased for the materials lab in Fryklund Hall. There’s still a long way to go as the Rockwell hardness testers are from the 1960’s or before. Engineers regularly refer to Rockwell numbers as the standard in industry. Our testers have dial gages and no electronics. Unfortunately much lab equipment has been used for so long with no replacement schedule that it’s now a major concern because so much needs updating.

As mentioned earlier, the computer engineering program has had a positive influence in laboratory development in the engineering technology electrical needs. It’s fortunate that engineering technology is a beneficiary of this program also. But there’s a long way to go. Today’s manufacturing is all about understanding electricity, electronics, computers, and controls. Electronics and teaching equipment can easily cost over $50,000 per unit. Obviously not too many stations like that are available.

The list goes on, and does every year when the Engineering and Technology Department prepares equipment requests. Choosing machines and budgeting is a fair process, but limited funding for high cost equipment keeps much of it out of the labs and on the list for several years.

2.4 Resources for the Program

2.4.1 Evaluate as to currency/up-to-datedness, quality, relevance, and quantity of the library resources to support the program. List or describe any information or service needs created over the past three years by concentration and course changes and include a brief statement as to how these needs have been met by the library.
My experience with the library has been positive. The materials are current. A special engineering technology site has many data bases where students can find information specific to their concentrations. This is reviewed and updated at least annually.

Engineering technology benefits from the close relationship to other degrees on campus such as plastics, computer, and manufacturing engineering, construction management, and business management to name a few. Resources for them are very applicable to us.

2.4.2 List any special resources used to meet program and/or student needs such as: Academic Computing, Instructional Technology Services for curriculum materials development, ASPIRE, Research Center, Media Self-Instruction Lab, Academic Skills Center, etc. List or describe any other resources which are needed to meet the program objectives with a brief statement as to how these would enhance or maintain the concentration quality.

Many times small group of ET assistants would be handy. They could help with events recruiting, tours, and more. That’s something to develop, but not a high priority.

2.5 Assessment in the Major

2.5.1 Attach your most recent Assessment in Major report.

The report is in the appendix.

3. Supply evidence of the quality of the graduates of the program.

3.1 Describe the demand for graduates and anticipated changes or trends in such positions/roles.

The demand for graduates has remained strong for the ET program. This is encouraging as the demand for college graduates across all disciplines nationwide has been poor in recent years. It should be noted that the placement date for employed in field or employed in a field related to the major is collected from the graduates themselves and hence is sometimes misleading. The low salary for the 2008-2009 graduates ($16K) was reported by a student who accepted a janitorial position who desired employment in his hometown. This had an impact on the mean salary for 2008-2009 graduates. The mean salary of $44 K is $4K lower than the previous year.

Placement date for the previous four years is given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Placement Rate</th>
<th>Salary Range</th>
<th>In or Related to Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>95%</td>
<td>16-44-80K</td>
<td>76%</td>
</tr>
<tr>
<td>2007-2008</td>
<td>95%</td>
<td>31-48-63K</td>
<td>87%</td>
</tr>
<tr>
<td>2006-2007</td>
<td>100%</td>
<td>33-46-65K</td>
<td>93%</td>
</tr>
<tr>
<td>2005-2006</td>
<td>93%</td>
<td>20-43-54K</td>
<td>85%</td>
</tr>
</tbody>
</table>
It is anticipated that demand for graduates of the ET program will remain strong. Requests from employers needing Cooperative Education students and full time employees has increased noticeably in recent months.

The majority of ET students are in the mechanical design concentration, which is the closest to mechanical engineering at UW Stout. According to the US Bureau of Labor statistics, overall engineering job growth will be equal to the average of all occupations through 2018. Jobs for mechanical engineers will grow slower than the average for various reasons. The report also indicated that the range of skills for mechanical engineers and emerging technologies such as biotechnology and nanotechnology will create new demands for their services.

3.2 Interpret the data from the Institutional Research Office follow-up studies.

The information in figure 1 was reported by 2008 engineering technology graduates in 2009 on the general survey in response to the question “How would you rate the overall effectiveness of your program/major?”

Thirty-seven engineering technology graduates responded to the general survey. The data shows that thirty-one graduates (84%) reported the overall effectiveness was high to very high. Only two (5.4%) of the 2008 graduates reported the program was not overall effective.

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Low</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>4</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>21</td>
<td>57%</td>
</tr>
<tr>
<td>5</td>
<td>Very High</td>
<td>10</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>37</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1, 2008 Graduates

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.03</td>
</tr>
<tr>
<td>Variance</td>
<td>0.75</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.87</td>
</tr>
<tr>
<td>Total Responses</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 1, 2008 Graduates

The mean score of 4.03 for the same question (table 1) is encouraging and indicates that engineering technology program graduates are very satisfied with the overall effectiveness of the engineering technology program. As expected, not everyone will be pleased with everything.
The graduating class of 2004 was also surveyed in 2009. There were 10 responses to the same question “How would you rate the overall effectiveness of your program/major”? All ten (100%) reported the overall effectiveness was high to very high. Results are shown in figure 2.

The mean score for 2004 graduates is 4.40. This indicates the 2004 graduates also reported the program was effective. (Table 2)

The results of both the 2004 and 2008 graduates are consistent and support a positive rating of the overall effectiveness of the engineering technology program.

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Low</td>
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<td>0%</td>
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<td>5</td>
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<td>40%</td>
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<tr>
<td></td>
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<td>100%</td>
</tr>
</tbody>
</table>

Figure 2, 2004 Graduates

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.40</td>
</tr>
<tr>
<td>Variance</td>
<td>0.27</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.52</td>
</tr>
<tr>
<td>Total Responses</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2, 2004 Graduates

The results from a survey of 2004 and 2008 engineering technology graduate’s employers are inconclusive. No employers responded for 2004 graduates and only three employers responded for 2008 graduates.

3.3 Interpret the major results from your Specific Program Survey.

Enrollment data is presented in figure 3. Total enrollment in engineering technology has grown from 337 students in 2005-06 to 397 in 2009-10. It is anticipated growth will continue for the next five years, more likely at a rate similar to between and 2008-2010. Historically, males comprise most of the engineering technology student population and will continue to do so.

It is rewarding to report that the female and minority student populations have shown significant
growth in the previous five years. In 2005-06 there were only seven females in engineering technology. In 2009-10, that number more than doubled to twenty-five. There has been an even larger increase of minority students. In 2005-06 there were eleven minority students. By the 2009-10 academic year that number grew almost three times to twenty.

The freshman class of 2008-09 was a banner year as just over one hundred new students entered the ET program. Recruitment data for the 2011-12 year suggests a decrease in the freshman population.

The transfer student population indicates growth also. Some of this is in response to layoffs and a generally poor economy, as learned from interviewing transfer students. Other reasons for transferring to engineering technology include the addition of the electrical concentration and completing a Bachelor of Science degree after earning an AAS in mechanical design or machine technology.
Figure 4 shows the number of engineering technology graduates between 2005-06 and 2009-10. When compared to the enrollment rate for freshmen, it’s easy to see that not all who start in engineering technology complete this degree.

The female and minority graduation rates are reflective of the increase in these student populations over the same time period.
The retention rate for engineering technology is also lower when compared to “any program” at UW Stout. The range in this category was 4.9% lower retention in 2006-07 to as much as 14.4% in 2008-09. (Figure 5)

The data in table 3 was collected in May, 2010 by surveying the juniors and seniors in engineering technology. The survey was emailed to 213 students. Forty juniors and sixty-two seniors responded, a 48% rate. The eight questions below are from a group of twenty questions that are especially important for employment in engineering technology careers. Students were given five (5) choices for answers. They are:

1= strongly disagree
2=disagree
3= somewhat disagree
4= somewhat agree
5= agree

In all categories the responses were between somewhat agree and agree, the highest positive response. The mean scores suggest junior and senior engineering technology students are
satisfied with the program and their academic progress.

As for the twelve questions not displayed, the lowest mean score was 3.86 in response to the question “The laboratory equipment for my program is up to date. That’s a fair response.

The balance of the questions had a range of mean scores from 4.13 to 4.72. The complete survey results are attached to the end of this report.

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>My critical thinking skills have been enhanced through my coursework.</td>
<td>4.71</td>
</tr>
<tr>
<td>My problem solving skills have been enhanced through my coursework.</td>
<td>4.72</td>
</tr>
<tr>
<td>Instructors in my program provide current and relevant information.</td>
<td>4.73</td>
</tr>
<tr>
<td>My program’s objectives were made clear to me and are being met.</td>
<td>4.59</td>
</tr>
<tr>
<td>My program requirements can be completed in a reasonable time.</td>
<td>4.45</td>
</tr>
<tr>
<td>As I near the completion of my degree, I feel confident that my program has prepared me to be successful in my profession.</td>
<td>4.33</td>
</tr>
<tr>
<td>Overall, this is a quality program.</td>
<td>4.59</td>
</tr>
<tr>
<td>If I had to do it all over again, I would choose this program.</td>
<td>4.13</td>
</tr>
</tbody>
</table>

Table 3, Jr/Sr in ET

A copy of the junior/senior survey is in the attachments. Question 4 asked students to list what they perceived to be the major strengths of the program? There were 68 responses, and 22 (almost 33%) stated the instructors were a major strength. Comments such as instructors really seem to know what they are talking about, or knowledgeable instructors were common place.

There were 14 students who reported the hands on learning to be a strength, a little over 20%.

Not surprising, only 2, or almost 3% reported the lab equipment was up to date nad a major strength of the engineering technology program.

It is refreshing to read these comments, and the program director agrees with all three.

In that same survey, question 5 was “What do you perceive to be the major weaknesses of the program”? The top entry was overlap of courses. Six students of 62 responses thought there was too much overlap. That’s almost 10%. This is surprising, and an investigation into what courses are considered to overlap will need to be conducted.

The next perceived weakness was not enough hands on work in the courses. Five students reported this, a little over 8%. Hands on is a great way to learn, it’s a Stout tradition.

Students also reported at fewer than 6.5% that old equipment was a weakness. The program director agrees with this and will continue looking for ways to improve the equipment in all labs.

In general the mean score for Key faculty, inside the department, ranged from 3.57 to 5.10. This relates to between good to excellent in all categories. The lowest score was mastery of degree content by program graduates with a 3.57 mean. The only other mean score below 4.0 was a 3.90 for quality of lab facilities for my course(s).
There were responses from teachers outside the department, apparently a mistake when sending core course information when the survey was created.

The advisory board was surveyed also. Their responses to question eight, “What do you believe are the major strengths of the program” are listed in table 4.

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>the ability to incubate future programs</td>
</tr>
<tr>
<td>the concentrations in areas of interest to students. industrial capstone</td>
</tr>
<tr>
<td>projects. faculty</td>
</tr>
<tr>
<td>Applied nature of the core program curriculum.</td>
</tr>
<tr>
<td>Practical hands-on with needed theory and great instructional staff</td>
</tr>
<tr>
<td>Variety of concentrations.</td>
</tr>
<tr>
<td>Good balance between theory and practice</td>
</tr>
<tr>
<td>hands-on, regular updates to curriculum to add new technologies</td>
</tr>
<tr>
<td>That is is being done at Stout which has a history of excellence in this</td>
</tr>
<tr>
<td>academic area.</td>
</tr>
<tr>
<td>Solid curriculum, foundation in applied technology, lots of labs</td>
</tr>
<tr>
<td>Matching the schools curriculum / coop experience to meet industry and</td>
</tr>
<tr>
<td>manufacturings needs and requirements.</td>
</tr>
<tr>
<td>Practical knowledge of principals and the ability for graduates to be</td>
</tr>
<tr>
<td>productive on the job immediately.</td>
</tr>
<tr>
<td>Stouts pratical application of knowledge</td>
</tr>
<tr>
<td>online delivery to meet working population, experienced faculty</td>
</tr>
<tr>
<td>Well rounded courses and positive history with employers</td>
</tr>
</tbody>
</table>

Table 4, advisory board strengths

The advisory board’s responses are in line with with the student’s responses to a similar question. Hands on, variety in concentrations, and curriculum and faculty are mentioned.

Question nine on the advisory board survey is “What do you believe are the major weaknesses (if any) of the program”? (See table 5)

The too many concentrations issue has been addressed as four concentrations have been eliminated. The funding issue for lab equipment shows again. I’m not aware of any or which top companies have dropped Stout from their recruiting list. A review of recent employers doesn’t show that.
I agree with the comment about a few faculty doing all the work. Participation for the largest program in the department isn’t as strong as it needs to be. This will be addressed as the ABET-TAC accreditation process begins.

The only other comment is that there is a lack of marketing the various concentrations in engineering technology. Selling mechanical design is easy, that’s what most student think ET is. There are other fine programs that would grow with the proper marketing strategy.

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many concentrations</td>
</tr>
<tr>
<td>Labs &amp; Equipment under funded</td>
</tr>
<tr>
<td>Top companies have removed Stout from their recruiting list. I believe that is because the quality of our graduates has declined. We need to increase the quality of our graduates so top companies will return to Stout. Top companies will help attract top students.</td>
</tr>
<tr>
<td>Some concentrations can be combined.</td>
</tr>
<tr>
<td>Too much focus on manufacturing</td>
</tr>
<tr>
<td>The engineering technology program is covering a wide water-front with a single advisory committee. I believe that each major should have a sub-advisory committee to help guide it.</td>
</tr>
<tr>
<td>Faculty participation - a few people are doing a lot of the work. John Schultz does a great job of working for the students and the program. Other faculty need to be actively engaged and involved in program activities.</td>
</tr>
<tr>
<td>Having a method of training past graduates of current skills required in the workplace. Maybe after hour classes or virtual classes would meet the requirement. Graduate core classes can bring Stout large costs per credit and usually are reimbursed from employers. I personally have a weakness on AutoCad, and Solid Works and I know that other engineers have a similar weakness.</td>
</tr>
<tr>
<td>To explain my response to #7, and to attempt to answer questions 8 - 11, I find it very difficult to answer any of these since, to my knowledge, the program committee has not met in several years. As such, I feel very uninformed of the current nature of the program. I will admit to not taking the initiative to keep myself up-to-date, which I perhaps should be doing. In any case, I do not feel that I can accurately respond to any of these questions without further information on the program.</td>
</tr>
<tr>
<td>funding</td>
</tr>
<tr>
<td>It really has limited marketing. The process for student papers needs some work.</td>
</tr>
</tbody>
</table>

Table 5, advisory board weaknesses
4. Supply evidence of continuous improvement efforts of the program.

Engineering technology will be seeking approval for a major program change in the spring 2011 semester to be effective in the fall of 2011. Because of all the concentrations, changes (improvements) are quite common. This will be my first major program change, and the first for engineering technology since 2006. The process has already spanned two years, and when one change is ready, it seems another is knocking at the door.

The ABET training in October brought to light the opportunity for additional program improvements prior to seeking the approval from the STEM college.

The major program plan change so far have been approved by the advisory council and includes:

- Updated curriculum and name changes from CADD to ENGGR, courses required by all ET students.
- Upgrading the plastics concentration courses by replacing a redundant course with a new processing course, eliminating prerequisites of non-related courses, and a new course name scheme that differentiates between engineering technology and plastics engineering courses.
- Adding lean manufacturing as a required course for production operations and as a selective to all other concentrations.

The addition of a new capstone course for all concentrations except mechanical design will be part of the FA11 program plan change. Mechanical design already has a capstone requirement, MECH 337. At least one other course is under review. Both of these action items are a result of information presented at the ABET training.

4.1. Describe the strengths and unique features of your program that distinguish it from similar programs. What are the weaknesses of the program?

A major strength of engineering technology is its reputation, longevity, and the ability to adapt to changing technological advances. The program started in the 1950’s to meet needs of industry. Manufacturers were hiring industrial education teachers for careers that didn’t require a mechanical engineering degree. At that time industrial technology was just beginning to catch on across the nation. Industrial technology began at Stout because of the availability of well equipped labs and technical expertise in several fields of study. Industrial technology was changed to engineering technology in the 2001. Many programs on campus today are spin offs from engineering technology because they became too large to manage as a concentration. Construction management, packaging, graphics communications, and the newest, supply chain management, were all engineering technology or the predecessor, industrial technology concentrations.

Engineering technology has more students than all the engineering programs at Stout. Our graduates compete for the same career positions with the same employers as the manufacturing engineers and will no doubt compete with the plastics engineers in the future.
There’s a continued high demand for the graduates, even under the unfavorable economic conditions of the past three years. Key strengths include a strong focus on providing curriculum that is important to employers, a broad manufacturing methods coverage, good laboratories, faculty that have relevant industry experience and are genuinely concerned for students, a good amount of academic rigor, and an overall format that blends theory, practice, and experimentation. In addition, the program is growing. The program has grown to almost 400 students, an increase of over 130 since 2003.

The primary weaknesses of the program include providing instructional staff based on program growth and the need to provide tools and equipment that are in line with current manufacturing practices.

 Manufacturing and plastics engineering and engineering technology share several courses. Growth in all programs will put a strain on the current teaching staff. It will be important to establish a core of faculty to provide primary support for recent and future program growth and to find faculty and position allocations to replace those who retired or have been reassigned. Recent retirees include Jerry Roiter and the vacated Andy Pandian position. Those reassigned are Dave Fly and Ron Scozzari who have recently accepted positions as program directors.

 Call staff teaching core courses is not favorable practice for ABET accreditation. Engineering technology needs a permanent group of experienced instructors to grow and meet accreditation requirements, advising, and general knowledge of the program requirements.

 The need for lab updates and improvements is evident and important for recruiting high school and technical college transfer students. Technical college graduates commonly mention they’re used to having labs that are equipped with newer and more equipment. They make up a large percentage of the engineering technology transfer population. Our metal and electrical labs fall short of any tech college labs visited in the past year. The research and wood labs in Jarvis Hall arguably have some of the oldest machines on campus. Some of that equipment is vintage and the replacement cost for equal quality could be exorbitant, yet, the digital controls and high performance machines are available in the industry and it is important for our students to have access to them.

4.2. Submit evidence of program response to the concerns and recommendations in your previous program review.

 Issues of concern from the 2003-2004 report included open faculty positions because of retirements and backlog for required courses.

 Interestingly, new faculty (seeking tenure) far outnumbers tenured faculty in the Engineering and Technology Department. The department has spent considerable time this semester evaluating staffing needs for the various programs it serves. The growth in all three engineering programs plus engineering technology will continue to create a concern for staffing.

 As in 2003-04, POWER 260 was on the radar in the SP11 semester as juniors and seniors filled the freshmen level course. A second section has been added in the SP11 semester and possibly one in the summer of 2011 may help. If the summer section is successful (fills) future summer
course may be a long range option. Other courses, such as MFGT 253 become a problem mainly for upperclassmen. The MFGT 253 schedule conflicts with the senior capstone and other senior level courses. Students are encouraged every advisement day to follow the program plan sheet. Changing the course time doesn’t seem to solve any problems. Experience has shown that moving a class meeting time only messes up the schedule for those who originally planned on taking the course.

Another issue of concern was the absence of concentration coordinators for production operations and facilities. Jim Keyes has been the coordinator for production operations for over three years and has agreed to continue serving. Mike Galloy has been the facilities coordinator for several years and will be stepping down after the SP11 semester. The PD will be assuming those responsibilities in order to learn more about the concentration. This decision was made prior to a commitment to ABET. There will be a need for a new coordinator in the future.

4.3 In the next seven years, what are the major improvements or changes you plan to implement to improve program quality?

A major accomplishment and most significant improvement would be ABET-TAC accreditation.

New concentrations are discussed as well as modifications to existing concentrations at every advisory board meeting. At times managing all six concentrations seems like herding cats, but a major program change is in progress for the FA11 semester. There are likely changes in the electrical and facilities concentrations and improvements created by combining two concentrations into one.

Program growth is possible by marketing the less populated concentrations instead of simply engineering technology. Most students consider engineering technology to be mechanical design only. It’s possible to have over 500 students in ET within seven years with emphasis placed on all concentrations.

Articulation agreements with technical colleges similar to the NTC, Wausau campus will grow the program. None are in the planning stages, yet there has been discussion on articulation agreements in the eastern region of Wisconsin.

5. Attachments

5.1 Submit any other information or documentation that may be helpful to the Planning and Review Committee in reviewing the quality of the program including interpretation of data from Institutional Research and PRC data.

See attachments.

5.2 Links of specific program information to be included:

- Program plan sheet
  http://www3.uwstout.edu/programs/bset/index.cfm

- Current assessment in the major
  http://www3.uwstout.edu/provost/upload/2009-UG-
• Current program advisory committee
  http://www3.uwstout.edu/provost/progcommittees.cfm

• Web address to 1 and 5 year studies
  http://www3.uwstout.edu/provost/prcbste.cfm

• Other items requested by the consultant

  Nothing was requested.