Introduction

Faculty in the Engineering Technology (ETec) Department have begun the process of program assessment. Our goals in this endeavor are to guarantee that we are currently and continue in the future to clearly define and provide a high quality education for our students, and to develop a plan to maintain long-term assessment and continuous improvement. The ETec Department is made up of six different programs: Manufacturing (MET), Plastics (PET), and Electronics (EET) Engineering Technologies, Industrial Design (ID), Industrial Technology (IT), and Technology Education (TE). In addition, the Industrial Technology program supports four options: Vehicle Design, Industrial Graphics, Industrial Supervision, and a self-designed option. Although there is a significant amount of diversity among our programs, each of them is a professional program.

As a result of both our common interests and our different program perspectives, we have been able to reach a working definition of a high quality education as one that not only prepares students for their careers, but does so in a way that makes them valued employees, both immediately and over the long-term, while simultaneously providing students with a broad-based liberal education that makes them strong, contributing members of society. To quantify a high quality education in a manner that could be measured, we listened to our Industrial Advisory Boards and researched the current opinions of many organizations on the subject, including TAC/ABET (our Engineering Technology accrediting agency), the Society of Manufacturing Engineers and other professional societies, and the NSF coalition schools, which are leading the way in outcomes based assessment methods in the field of engineering education. Starting with this information and our own experiences, we created a list of characteristics that we believe that every graduate of the ETec Department at WWU should display. This list is given in Table 1: ETec Department Student Learning Objectives – Desired Student Skills, which is shown on the following page. These are skills that we expect every graduate to display regardless of the program from which they graduate. The one exception to this is the Programming Skills, which are only required of the students receiving Engineering Technology degrees, as it is also a requirement of the TAC/ABET accrediting agency.
### Analytical Skills
Ability to: logistically analyze and solve problems from different points of view; translate scientific and mathematical theory into practical applications using appropriate techniques and technology.

### Visual Communication Skills
Ability to: utilize appropriate technology to create drawings, illustrations, models, computer animations, or tables to clearly convey information; interpret and utilize similar information created by others.

### Oral Communication Skills
Ability to: verbally present ideas in a clear, concise manner; plan and deliver presentations; speak and listen effectively in discussions based upon prior work or knowledge.

### Written Communication Skills
Ability to: present ideas in clear, concise, well-structured prose; choose appropriate style, form, and content to suit audience; utilize data and other information to support an argument.

### Project Management Skills
Ability to: set goals; create action plans and timetables; prioritize tasks; meet project milestones; complete assigned work; seek clarification of task requirements and take corrective action based upon feedback from others.

### Teamwork Skills
Ability to: work together to set and meet team goals; encourage participation among all team members; listen and cooperate; share information and help reconcile differences of opinion when they occur.

### Creative Problem Solving
Ability to: apply a design process to solve open-ended problems; generate new ideas and develop multiple potential solutions; challenge traditional approaches and solutions.

### Business Skills
Ability to: accurately estimate production costs; calculate the cost effects of alternative designs; predict the effects of quality control, marketing, and finance on product or process cost.

### System Thinking Skills
Ability to: understand how events interrelate; synthesize new information with knowledge from previous courses and experiences.

### Self-learning Skills
Ability to: learn independently; continuously seek to acquire new knowledge; acquire relevant knowledge to solve problems.

### Ethics and Professionalism
Ability to: understand and demonstrate professional and ethical behavior; understand social and ethical implications and interrelations of work, and respond in a responsible and professional manner.

### Programming Skills
Ability to: use higher level, structured programming languages to write effective and efficient code to complete a task such as modeling or calculation, or control equipment; understand and adapt existing structured programs.

### Technology Skills
Ability to: properly use industrial-quality technology appropriate to field; adapt to new technology; integrate existing technology to create new possibilities.

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Ability to: properly use industrial-quality technology appropriate to field; adapt to new technology; integrate existing technology to create new possibilities.

### Table 1: ETec Department Student Learning Objectives – Desired Student Skills

In order to guarantee that we are working towards our goals and that students are graduating with the skills that we have deemed to be vital, we have developed a comprehensive, long-term assessment plan for the ETec Department, which is described in detail in the next section. As part of this plan, we have conducted a preliminary assessment of our own classes to gauge the level to which we are currently specifically addressing our desired student learning outcomes at this time. For this survey we solicited the opinions of faculty as to the degree that they teach, review, and reinforce various student learning outcomes in each of their courses. This has provided us with a baseline to understand where we currently are relative to where we would like to be in the near future. The results of this survey are discussed after the description of the long-term plan.
Implementation Plan

The ETec Department Assessment Committee has drafted a plan for the long-term development of a comprehensive assessment strategy. This plan was agreed upon by the ETec faculty during a department meeting on November 22, 1999. Each year of the plan is described below the outline of the plan. The outline of the plan is as follows:

1999-2000:
- Report on Programs’ current status of addressing learning goals. (this document)
- Alumni Survey. (drafted – see Appendix D)
- Senior Exit Survey. (partially drafted – see Appendix E)
- Employer Survey. (under development)
- Meet with each program to discuss results of Program Reports and to complete Program section of Senior Exit Survey. (winter)
- Have each Program revise its strategic plan. (spring)

2000-2001:
- Develop Program plans for meeting learning goals.
- Refine survey instruments.

2001-2002:
- Pilot Course Evaluation Forms to assess student learning vis-a-vis stated goals.

2002-2003:
- Institute Department wide Course Evaluation Forms.

2003-2004:
- Pilot Student Portfolio Project for student learning assessment.

2004-2005:
- Institute full-scale Student Portfolio Project.

2005-2006:
- Review two-year Portfolios for sophomores and seniors in preparation for planned TAC/ABET visit.

1999-2000

This fall the Assessment Committee conducted a self-assessment survey of all classes in the ETec Department, the results of which are shown in Appendix C and discussed in the next section. This survey is not a true assessment, but it is designed to give us a clear picture of what we believe we are doing in our classes at this time to address the desired student learning outcomes. During the winter quarter each program or program coordinator should meet with the Assessment Committee or at least the Chair to discuss the findings of the self-assessment survey and discuss the program specific section of the Senior Exit survey. During the winter and spring quarters we will begin some actual assessment with Senior Exit, Alumni, and Employer surveys. Surveys are an indirect assessment method, but they still provide valuable information regarding the perceptions of people who have completed our program and hired our graduates.

Of these three surveys the Alumni survey (Appendix D) is the only one that is complete and ready to use. The first half of the Senior Exit survey (Appendix E) regarding student learning outcomes is complete, but each program needs to develop a program specific page for the second
half of the survey. We also need to determine the best avenue for distributing this survey. These
should not be major obstacles, however, and we should be able to survey students who are
graduating in the spring, and with luck students who are graduating in the winter as well. The
employer survey will be modeled after the alumni CORE skills survey, however, before major
effort is exerted on this document we need to confirm that such a survey will not violate com-
pany policies or rules. This was a significant problem when the MET program last attempted an

The final goal for this year is to have each program in the ETec Department revisit and poten-
tially revise its strategic plan. As part of this strategic plan, faculty in each program should de-
termine to what level each student learning objective should be addressed in their program.

2000-2001

The primary goals for this year is to revise our survey instruments and to have faculty in each
program develop a plan for meeting the student learning objectives to the level that they deter-
mined to be appropriate the previous year. Although this does not sound like a very ambitious
plan, last year’s attempt to do a self-assessment demonstrated that developing a clear and mean-
ingful survey instrument is not a trivial task. Moreover, since the Senior Exit survey will be the
basis for Course Evaluations that are developed in following years it is critical that we have a
good instrument at our disposal.

2001-2002

The goal for this year is to develop and test the Course Evaluations. Faculty will be asked to al-
low their students to be surveyed on a volunteer basis. Ideally we will be able to survey students
at all levels during each quarter so that we may refine the questions until the instrument is clear
and effective. It is important to remember that the goal of this is to provide faculty with feed-
back regarding student perceptions of their learning vis-a-vis the ETec student learning objec-
tives. This will not be designed to rate faculty, but to confirm that students are learning the skills
we are trying to teach.

2002-2003

The goal for this year is to take the Course Evaluation and institute it across all of our courses in
all of our programs. This will serve to provide faculty with feedback and also to create a picture
of the level to which students are developing desired skills in each program. It will also be a sig-
nificant challenge for the Assessment Committee to develop a method for sorting through all of
this information in a timely and efficient manner.

2003-2004

This will be a challenging year as well, as the goal is to develop a pilot student portfolio project.
The portfolios constitute a direct assessment technique, which is much stronger evidence of stu-
dent learning than any form of survey. The difficulty will be developing methods for collecting
a reasonable amount of information from students and reviewing that information. The Assess-
ment Committee will be asking faculty to volunteer to take part in the development year, and also doing some research as to how other programs at other schools collect and review portfolio information.

2004-2005

The goal for this year will be to institute a full-scale portfolio project so that we will have two-year portfolios for sophomore and senior students by the next TAC/ABET visit. Starting a full-scale implementation of the project this year will also give us an opportunity to make changes to courses or programs before the TAC/ABET collection year should the portfolios show any shortcomings in the ETec Department.

2005-2006

If all goes as planned, this will be the year the MET, PET, and EET programs are collecting information for the next TAC/ABET visit. Both the direct and indirect assessment methods should be in place at this time. The goal for this year will be to collect a second year of student portfolio data, and if we have not already done so, to develop our assessment plan for the next six years.

Preliminary Assessment Results

The Assessment Committee designed the self-assessment of course content survey to give every program the opportunity to review the level of emphasis that programs are currently placing on each of the identified student learning outcomes. The results of the survey divided by program are in Appendix C. Since much of the specific discussion that follows regards issues that program faculty need to review in order to determine whether the current level of emphasis is appropriate to the field, or if more emphasis should be placed on certain skills at some point or points in the curricula, it is important to remember that there are many consistent strengths to programs in the ETec Department. It should not come as a surprise that students receive high exposure to the development of Analytical and Technology Skills in almost all programs; this is what we do after all. The assessment also clearly shows that programs throughout the ETec Department are doing a very good job of developing Creative Problem Solving and System Thinking Skills in our graduates. On the other hand, every program should review its approach to teaching students Ethics and Professionalism, as only the EET, ID, and TE programs seem to provide either a major experience or repeated significant experiences in this area. One final area, Self-Learning Skills is a very open-ended issue. How much independent learning should students be required to do? Once again, it is likely that the current level in all programs is appropriate, although a review by the faculty in each program in consultation with Industrial Advisory Boards and Professional Societies is recommended. It is not possible to draw meaningful generalizations across all programs in the remaining student learning outcome areas, so these are discussed separately for each program.

Manufacturing Engineering Technology

The review of the MET program shows that graduates are getting a significant amount of training and practice writing, and this does not include the fact that all MET students take Eng 302.
Nonetheless, since writing is such an important topic, and since WWU is in the process of adding a second major writing requirement for all graduates, MET faculty or the ETec Department as a whole may want to consider an appropriate course for adding such an experience. There are other issues that MET faculty should review as well. The only significant development of Visual Communication Skills takes place during the introductory engineering design graphics sequence. MET faculty should consider whether there are enough experiences throughout the remainder of the curriculum to guarantee that students retain these skills, including the ability to properly specify the details on an engineering drawing, through to graduation. MET faculty also need to review the emphasis that the program places on Oral Communication Skills. MET students are required to take Comm 101, but none of the required program classes require multiple student presentations or presentations to external audiences in which everyone must participate. In addition, the only significant oral communication experiences students receive in required classes come during senior level courses (420, 421, 422). MET faculty should explore where there might be room for students to gain some instruction, experience, and feedback in oral communication earlier in the curriculum, or if the current level is appropriate to the field. Another area of immediate concern to the MET program should be Teamwork Skills. Due to the structure of the senior project students receive limited exposure to teamwork beyond working on laboratory teams. The current plan is to devote some time to teamwork and teamwork skills in Etec 225 and potentially in Etec 111 as well, which would provide students with a good base in understanding teamwork, but MET faculty should review whether there is enough reinforcement of these skills later in the curriculum. This lack of an emphasis on teamwork also effects student experiences with Project Management. Since the upper levels of project management were defined as including organizing people onto successful teams it will be difficult for the MET program to provide a major project management experience without a major team experience during the latter part of the curriculum. The remaining topics, Business Skills and Programming Skills, also deserve review, but it is likely that these are issues of less concern than those already mentioned. Business skills are important, but this survey does not include what students learn in Mgmt 460 and 463 (an issue that the Assessment Committee will discuss with Manufacturing Management faculty), so it is quite possible that the level of emphasis in the MET program is appropriate. Programming skills also appear to be a concern based upon raw scores, but once again it is likely that the level of emphasis is appropriate to the program, provided that every student is getting the opportunity to practice these skills.

Plastics Engineering Technology

The results of the survey of the PET program are very similar to those of the MET program. Written Communication Skills are emphasized throughout the PET program and so do not appear to be a major concern. Visual Communication Skills are taught during the introductory engineering design graphics sequence, and thus it is worth reviewing whether students are practicing these skills enough to retain them through to graduation. As with the MET program, there might be a need to strengthen the Oral Communication and Teamwork components of the program, although PET students do have one more major teamwork experience than MET students. Despite any questions that may exist about the number of teamwork experiences PET students receive, the ratings indicate that PET students are getting a large amount of Project Management experience. Business skills, however, are more of a concern than with the MET students, as PET students take neither Etec 327 nor any classes from the Management Department. Finally, the
survey results indicate that PET faculty should review the level of Programming Skills that students are exposed to in order to ascertain whether or not they are appropriate for the field.

**Electronics Engineering Technology**

It is difficult to make any firm recommendations to faculty in the EET program due to the number of courses that were estimated. Based on these estimates there appears to be a less consistent approach to developing Written Communication Skills than in MET or PET, but students are still receiving a number of major experiences in this area. The estimates do indicate that students are not receiving significant instruction or practice in the areas of Oral Communication, Project Management, or Teamwork before their senior year, and thus EET faculty should review how these student learning outcomes are addressed during the early parts of the program. The estimates also indicate that Business Skills could be of some concern for EET students, as they seem to get a very limited exposure to this area. Once again, it is also recommended that EET faculty review the amount of exposure students get to Programming to ensure that it is appropriate for the field.

**Industrial Design**

The ID program has obvious strengths in Oral and Visual Communication and Project Management. Since the levels for the senior design classes were estimated, there may be some errors in these recommendations, but the survey results indicate that ID students do not receive much experience in the area of Teamwork, and do not receive any major experiences in Written Communication after their sophomore year. On the other hand, the survey does indicate that ID students receive multiple opportunities to develop and practice Business Skills.

**Industrial Technology – Vehicle Design**

The Vehicle Design program has a strong, consistent approach to developing students, Written Communication and Project Management Skills, and unlike the MET and PET programs, students also receive a major Visual Communication experience after their first year in the program. Faculty in Vehicle Design should review the level of training and practice that students receive in the areas of Oral Communication and Business Skills to confirm that the levels are appropriate to the field. Finally, the survey indicates that students do not receive much experience in the area of Teamwork in their classes, however, since all or virtually all students in the Vehicle Design program participate in team-based competitions such as SAE Formula Car, there is good reason to believe that these students are gaining significant and meaningful experience in this area as well.

**Industrial Technology – Industrial Graphics**

The development of student’s Visual Communication Skills is an obvious strength of the Industrial Graphics program. Written and Oral Communication, however, are areas of concern, as students do not appear to receive any major experiences in either of these areas in their program classes. Teamwork is also a major concern, as it appears to be lacking from the program, which also effects students’ exposure to Project Management, although this area is otherwise generally
strong. Finally, Industrial Graphics faculty are encouraged to review student’s exposure to Business Skills to confirm that they are appropriate to the field.

**Industrial Technology – Industrial Supervision**

It is difficult to draw too many accurate conclusions from the survey regarding the Industrial Supervision program, as students take four of their seven specialization classes from the Management Department. Given this fact the Written Communication component of the program appears to be strong and it is safe to assume that Business Skills are well developed too, but faculty are encouraged to review whether or not students are receiving sufficient instruction, practice, and feedback in the areas of Visual and Oral Communication, Project Management, Teamwork, and Creative Problem Solving. Getting information about Mgmt 301, 460, 463, and 465 will clarify the assessment of this program.

**Technology Education**

According to the survey, students in TE receive a vast amount of training and experience in Oral and Written Communication, Project Management, and Teamwork. On the other hand, there is very little development of student’s Analytical or Business Skills, and students receive their most significant Visual Communication experiences at the beginning of the program. Faculty in TE are encouraged to review these latter student learning outcomes to ensure that they are appropriate to the field.

**Conclusion**

The recommendations discussed in the previous section are based upon what we believe we are teaching students in our classes. This in itself does not constitute a true assessment of our programs, but hopefully it provides a base line for program faculty to reflect upon the priorities of the program curricula and to be prepared to react when actual assessment data is collected. According to our plan, we will begin to collect this data this year through our Senior Exit, Alumni, and Employer surveys. These should provide independent data, and we may discover that our students are well prepared in some areas our self-assessment indicated we were not covering sufficiently, while they are not well prepared in other areas we believe we are covering in detail. As such, we should all keep an open mind regarding the results of these surveys, and remember that the goal is to improve our programs in the long run. Once we have developed accurate assessment tools, we can begin to initiate assessment at the course level in order to provide faculty with more detailed feedback relative to addressing student learning objectives in classes. After this indirect assessment method is in place we can begin to develop the student portfolio project so that we can have two sets of two-year portfolios collected from sophomores and seniors for our next expected TAC/ABET review. The portfolio project will require a major effort on the part of all ETec faculty, and it will take a significant amount of planning to coordinate a review of the material, but there is no substitute for this type of direct assessment of student achievement. All of this effort, coupled with continued use of strong Industrial Advisory Boards and responsiveness to Professional Societies will allow us to maintain strong programs throughout the ETec Department, and leave us well positioned to maintain a program of continuous improvement that is responsive to both the needs of our students and the needs of the industries that will hire them.
Appendix A: Definition of Levels for Meeting Learning Goals in Classes

**Analytical Skills** – Ability to: logically analyze and solve problems from different points of view; translate scientific and mathematical theory into practical applications using appropriate techniques and technology.

5 – Course contains significant development of analytical skills, and reinforcement and practice of analytical skills developed in earlier classes.

4 – Course contains significant development of analytical skills, with little reinforcement or practice of analytical skills developed in earlier classes.

3 – Course contains some development of new analytical skills, and some utilization of previously developed skills.

2 – Course contains significant utilization of previously developed skills, but little or no development of new skills.

1 – Course utilizes some previously learned analytical skills, but develops no new ones.

0 – Course neither develops nor utilizes any analytical skills.

**Visual Communication Skills** – Ability to: utilize appropriate technology to create drawings, illustrations, models, computer animations, or tables to clearly convey information; interpret and utilize similar information created by others.

5 – Course contains significant instruction in development of drawings, illustrations, models, or computer animations with multiple assignments. Course should also contain at least one assignment completed with iteration and feedback, and at least one assignment prepared for external review.

4 – Course contains significant instruction in development of drawings, illustrations, models, or computer animations with multiple assignments.

3 – Course contains multiple assignments in visual communication with some instruction on the development of new skills and feedback.

2 – Course utilizes students’ existing skills in visual communication for multiple smaller or one large assignment, and provides examples and limited feedback, but little to no instruction on topic.

   OR

   Course contains significant instruction in the understanding and utilization of visual information produced by someone or something else, such as a computer analysis packages.

1 – Course requires one or two small assignments utilizing visual communication, but provides limited feedback and no instruction on the subject.

   OR

   Course contains some instruction in the understanding and utilization of visual information produced by someone or something else, such as a computer analysis packages.

0 – Course contains no visual communication by students of any kind (faculty are still visible).
Oral Communication Skills – Ability to: verbally present ideas in a clear, concise manner; plan and deliver presentations; speak and listen effectively in discussions based upon prior work or knowledge.

5 – Course contains at least two formal presentations that every student participates in, including presentation preparation instruction, supervised practice or review of content before the presentation, and written feedback. Formal presentations are defined as being given to an external audience (external to the course) and having a rigid time limit. In addition, the course content includes consistent in-class discussion with participation of all students, and part of the course grade is based on this discussion. For this purpose, in-class discussion is the exploration of concepts or ideas based upon out of class assignments such as reading, not “how do I solve problem 2?”

4 – Course contains at least two formal presentations with instruction and feedback as described above, and course has a significant, but ungraded in-class discussion component.

3 – Course has at least one formal presentation, but with limited preparation instruction and feedback, and no external audience. Course should also have some in-class discussion.

2 – Course has one or two informal presentations that may not include every student speaking. Course should also have some in-class discussion.

1 – Course has some in-class discussion, but no student presentations of any kind.

0 – Course has no student presentations and no in-class discussion of any kind.

Written Communication Skills – Ability to: present ideas in clear, concise, well-structured prose; choose appropriate style, form, and content to suit audience; utilize data and other information to support an argument.

5 – Formal, written reports/papers are the majority of the grade for the course. Multiple rough drafts are required during the quarter and feedback is given. The reports/papers are critiqued for both technical content, grammar, and spelling. This may also include large portions of exams that are essay format.

4 – Written reports/papers comprise a large portion of the course grade. This includes both formal (prescribed format) and informal (unprescribed format) reports/papers that are graded on technical content, grammar, and spelling. This may also include large portions of exams that are essay format. One assignment with drafts returned with feedback.

3 – Written reports/papers comprise a portion of the course grade. This includes both formal (prescribed format) and informal (unprescribed format) reports/papers that are graded on technical content, grammar, and spelling. This may also include portions of exams that are essay format.

2 – Written reports/papers comprise a small portion of the course grade. Report/paper grade is based on content. Students receive feedback on grammar or spelling. This may also include portions of exams that are essay format.

1 – Essay questions on exams. Written reports/papers are not part of the course grade.

0 – Multiple choice, T/F, or calculations on exams. No essay questions. No written reports/papers.
**Project Management Skills** – Ability to: Set goals; create action plans and timetables; prioritize tasks; meet project milestones; complete assigned work; seek clarification of task requirements and take corrective action based upon feedback from others.

5 – Projects require scheduling resources (such as tools, supplies, machines, or assistance from others), setting goals, writing procedures, and verifying progress towards meeting deadlines established by the student. Instruction in project management techniques is provided and assessed as part of course. Projects require the use of formal or informal teams, and establishing human resource roles. Teams are required to use modern project management tools and make a presentation that includes project management information to an external audience.

4 – Projects require scheduling resources (such as tools, supplies, machines, or assistance from others), setting goals, writing procedures, and verifying progress towards meeting deadlines established by the student. Instruction in project management techniques is provided and assessed as part of course. Projects require the use of formal or informal teams, and establishing human resource roles.

3 – Projects require scheduling resources (such as tools, supplies, machines, or assistance from others), setting goals, writing procedures, and verifying progress towards meeting deadlines established by the student.

2 – Some student projects, weekly or longer, require a procedure, process plan, or timeline before any other work can be performed. In addition, intermediate deadlines and an analysis of success in meeting the plan are part of a final report and grade.

1 – Some student projects, weekly or longer, require a procedure, process plan, or timeline before any other work can be performed.

0 – No prior planning for any project is required of the student.

**Business Skills** – Ability to: accurately estimate production costs; calculate the cost effects of alternative designs; predict the effects of quality control, marketing, and finance on product or process cost.

5 – A major class team project requires establishing a mock business to design and produce a product, and the grade is based at least partly upon the financial analysis and/or success of the endeavor.

4 – A major portion of the course discusses production costs, cost effects of alternative designs, and the interaction of functions in a business that relate to these costs, such as quality control, marketing, and finance. Case studies, outside reading assignments, and guest speakers are used to reinforce concepts.

3 – A major portion of the course discusses production costs, cost effects of alternative designs, and the interaction of functions in a business that relate to these costs, such as quality control, marketing, and finance.

2 – Cost implications and their affect on other functions of a business are discussed. Appropriate manufacturers catalogs are used to verify cost.

1 – Relative costs of alternative methods or materials are discussed.

0 – No mention is made of cost of production or business functions.
Teamwork Skills – Ability to: work together to set and meet team goals; encourage participation among all team members; listen and cooperate; share information and help reconcile differences of opinion when they occur.

5 – Students work in a structured team during the entire quarter. Roles and responsibilities of each team member are detailed. Students are graded and given feedback on the “output” of the team (written or oral report or completed project). Students are also graded by observations made by the instructor on the team work skills of each student. The majority of the grade is based on this team project. Includes significant instruction on teamwork.

4 – Students work in a structured team during the entire quarter. Roles and responsibilities of each team member are detailed. Students are graded and given feedback on the “output” of the team (written or oral report or completed project). Students are also graded by observations made by the instructor on the team work skills of each student. The majority of the grade is based on this team project. Course contains some instruction on teamwork and how to define roles.

3 – Students work in teams on a majority of the course assignments. Most of the course grade is based on assignments worked on in teams (>50%).

2 – Students are in teams for laboratory work, lab reports/papers, and HW assignments. Assignments worked on in teams are not the majority of the course grade (<50%).

1 – Students may work on HW assignments and study for exams together.

0 – Students may study for exams together, but all graded assignments are individual efforts.

Creative Problem Solving – Ability to: apply a design process to solve open-ended problems; generate new ideas and develop multiple potential solutions; challenge traditional approaches and solutions.

5 – Course revolves around design. Course should contain one significant design problem or several smaller design problems so that design is part of the course during the entire quarter. This course should include the application of a design process and the consideration of multiple solutions to any given problem. The course should also include consistent guidance and feedback.

4 – Course contains many open-ended problems and a large design project, or course contains many open-ended problems and several smaller design projects. Design component does not last for entire quarter, and instruction on design and design process, and guidance and feedback are limited.

3 – Course contains many open-ended problems and a small multi-week design project.

   OR

   Course contains one significant design project with multiple solutions considered and some open-ended problems.

   OR

   Course revolves around open-ended problem solving.

2 – Course contains many open-ended problems or course contains a small, multi-week design project.

1 – Course contains some open-ended problems, but no design projects.

0 – Course contains neither open-ended problems nor design projects.
**System Thinking Skills** – Ability to: understand how events interrelate; synthesize new information with knowledge from previous courses and experiences to solve problems.

5 – Course relies on previous student experiences. Students are given assignments where they analyze all of the possible effects and interactions of process or product variables that affect the outcome, such as realistic problem solving or troubleshooting. Students are given assignments that rely heavily on material presented in prerequisite courses. System thinking and development of such skills are the major focus of the course. Course contains significant instruction on the development of system thinking skills.

4 – Course relies on previous student experiences. Students are given assignments where they analyze all of the possible effects and interactions of process or product variables that affect the outcome. Realistic problem solving and troubleshooting are possible assignments. Course contains significant instruction on the development of system thinking.

3 – Course relies on previous student experiences. Assignments rely on the students’ existing system thinking ability. Students are given instruction on system thinking, but it is not a major focus of the course.

2 – Course relies on minimal previous student experiences. Students are given instruction on system thinking, but focus on the development of skills is limited.

1 – Course relies on no previous student experiences. System thinking is mentioned in the course, but course does not focus on the development of skills.

0 – Course relies on no previous student experiences. Course covers topics without discussing relationships with other fields or areas.

**Technology Skills** – Ability to: properly use industrial-quality technology appropriate to field; adapt to new technology; integrate existing technology to create new possibilities.

5 – Students make significant use of modern, industrial-quality technology of the kind that students would be expected to use if they were hired today.

4 – Students make some use of modern, industrial-quality technology, or make significant use of older industrial technology of the type that once was common in industry, but is now out of date.

3 – Students make some use of older industrial-quality technology, or make significant use of instructional technology that mimics the type of technology used in industry, but is not of the quality or capability to be considered for an industrial environment.

2 – Students make use of some instructional technology, or course exposes students to industrial-quality technology through trips to companies, but students are not allowed to operate equipment.

1 – Students are exposed to some instructional technology through demonstrations or course exposes students to some industrial-quality technology through videos or pictures, but they do not visit the actual technology.

0 – Students are not exposed to technology at all during the class.
**Self-learning Skills** – Ability to: learn independently; continuously seek to acquire new knowledge; acquire relevant knowledge from outside sources to solve problems.

5 – Entire grade is based on independent work. Student performs the complete investigations, and also has selected the problem and written the goals and objectives.

4 – Entire grade is based on independent work. Student performs the complete investigations, but the problem and potentially the goals and objectives come from another source.

3 – A major part of the grade is based on oral or written reports, or student designed lab projects that require individual investigation.

2 – A small part of the course grade is based on oral or written reports, or student designed lab projects that require individual investigation.

1 – Homework and lab assignments require some research by the student in areas that are not covered in the lecture or text.

0 – All course material is covered in a lecture. All homework assignments and lab projects follow an assigned procedure.

**Ethics and Professionalism** – Ability to: understand and demonstrate professional and ethical behavior; understand social and ethical implications and interrelations of work, and respond in a responsible and professional manner.

5 – Subject of the class centers on ethics/human values/professionalism/and technology. Most class discussions and lectures are directly targeted at ethics/technology/engineering. [Technology and Human Values, for example]. Students write/discuss/research/present on these issues multiple times. The class is for this purpose. Students consider the issues each class and have time to reflect upon these difficult issues. Students often present their views to an audience.

4 – The class includes multiple lectures/discussions on technology/human values/ethics/professionalism, although the focus of the class may be for another purpose. The issue is woven throughout the course, although the course itself has another focus. Students consider the issues often and have time to reflect upon these difficult issues. They write formally and informally about these issues. Class discussions often center on some aspect of "ethics." Students have time to present their views to an audience.

3 – The class includes at least one lecture/classroom discussion centering on ethics/technology/human values. There is follow-up discussion in subsequent classes and the subject remains a discussion item/lecture item in multiple classes. The students write or research about the issue, at least informally.

2 – The instructor includes ethical/value issues multiple times during the quarter as part of a lecture/discussion, but the focus of the lectures still remain on other aspects of technology.

1 – The topics addressing ethics/human values/technology are brought up occasionally in lecture or discussion. No particular focus or structure, but the instructor makes sure the issue is addressed occasionally when appropriate.

0 – Nothing in lecture or class discussions center on ethics/human values/technology/professionalism.
**Programming Skills** – Ability to: use higher level, structured programming languages to write effective and efficient code to complete a task such as modeling or calculation, or control equipment; understand and adapt existing structured programs.

Note: A *higher level* programming language is one that includes structured concepts such as decision operators (if, etc.), looping operators (while, for, etc.), and subroutines or functions.

5 – Learning higher level programming language and writing programs is the main purpose of the class. Students write multiple programs with significant instruction and feedback. Course contains at least one assignment where program is improved over a period of time.

4 – Students are required to learn a higher level programming language to complete a significant project or projects in the class. Programming instruction is limited, but completing the programming is an essential component of the class.

3 – Students are required to utilize a higher level programming language in the course on some assignment, but do not necessarily have to learn any new aspects of it or require it to complete major projects.

    OR

Students are required to learn a new, lower level programming language and utilize it for a significant amount of the course assignments, or on a large project or projects.

2 – Students are required to utilize lower level program language to complete some assignments. Instruction on the topic is limited.

1 – Students are required to utilize programs where they can write small macros to complete assignments. No instruction on the programming aspect is provided in the course.

0 – Course has no programming component at all.
Appendix B: Faculty Self-Assessment Survey of Course Content Form

Please fill out this form rating the level to which Department Learning Objectives are being met in your courses. Use the *Definition Of Levels For Meeting Learning Goals In Classes* document that was sent to you (if you do not have this there is a copy in ET 204) to rate your class on a 0-5 scale, as per the definitions that are provided. Rate every class you are teaching this year and any additional classes that you taught last year that you expect to teach again. If your course falls in between two levels pick the lower score. This is not a contest, and there are no prizes for having the highest score, so please rate your courses as honestly as possible.

Please return this document to Jeff Newcomer, either via e-mail or as a hard copy in my mailbox in ET 204 by the end of the day on Tuesday, November 30. It is very important that all surveys are completed and returned by this date, as the Assessment Committee would like to have draft reports on every program ready by the middle of exam week.

<table>
<thead>
<tr>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Learning Objectives</td>
</tr>
<tr>
<td>Analytical Skills</td>
</tr>
<tr>
<td>Visual Communication Skills</td>
</tr>
<tr>
<td>Oral Communication Skills</td>
</tr>
<tr>
<td>Written Communication Skills</td>
</tr>
<tr>
<td>Project Management Skills</td>
</tr>
<tr>
<td>Business Skills</td>
</tr>
<tr>
<td>Teamwork Skills</td>
</tr>
<tr>
<td>Creative Problem Solving Ability</td>
</tr>
<tr>
<td>System Thinking Skills</td>
</tr>
<tr>
<td>Technology Skills</td>
</tr>
<tr>
<td>Self Learning Skills</td>
</tr>
<tr>
<td>Ethics and Professionalism</td>
</tr>
<tr>
<td>Programming Skills</td>
</tr>
</tbody>
</table>

Questions? Contact Jeff Newcomer at x7239 or by e-mail at newcomj@cc.wwu.edu. Thank you.
Appendix C: Results of Faculty Self-Assessment Survey of Course Content

The following pages contain the results of the faculty self-assessment survey of course content regarding student learning objectives broken down by program. The totals and averages are provided for each program (and sub-program in the case of Industrial Technology) based upon the required courses that students must take from the ETec Department. Elective courses are listed below the total and average scores. The total and average scores should only be used as guidelines to indicate the relative level to which each skill is currently being addressed inside each program’s curriculum. One of the goals for the remainder of this year is to have each program determine the level to which each student learning outcome should be addressed in the curriculum, and when it should be addressed. This will be followed by the development of a plan for getting the appropriate level of instruction, feedback, and practice for each student learning outcome for each program.

Note:

Magenta entries indicate planned changes to courses that should occur this academic year.

Cyan entries are estimates. It was necessary to estimate these courses due to the unwillingness of two senior faculty and one adjunct to participate in the self-assessment process.
Appendix D: Alumni Survey and Cover Letter (to be mailed W 2000 quarter)

Engineering Technology Department
Western Washington University
Alumni General Information Survey

Important: Please complete this survey immediately and return it as quickly as possible

________________________________________________________________________
Name         Grad. Date
________________________________________________________________________
Company Name        Phone Number

________________________________________________________________________
Address        City, State        Zip Code

The information requested herein will be held in strict confidence and will be used only for statistical analysis. No individual or company will be identified. Please feel free to give complete and frank answers.

1. Who is the highest-ranking person in your company who is familiar with you and your job?

________________________________________________________________________
Name                Title
________________________________________________________________________
Address        Phone Number

2. The primary emphasis of your company is: (Check only one)

A. ____ Distribution                E. ____ Manufacturer’s Rep.
B. ____ Construction                F. ____ Government
C. ____ Engineering                G. ____ Research and Development
D. ____ Manufacturing                H. ____ Other (please specify) _______________

3. Please mark which of the following best describes you current job function:

A. ____ Operations                D. ____ Development
B. ____ Production                E. ____ Research
C. ____ Design                F. ____ Other (please specify) _______________

4. Please mark which of the following best described your job function in your first job after graduation:

A. ____ Operations                D. ____ Development
B. ____ Production                E. ____ Research
C. ____ Design                F. ____ Other (please specify) _______________
5. What is your present basic annual salary? (Do not include royalty or other income)

A. ____ Under $19,999  
B. ____ $20,000 – $24,999  
C. ____ $25,000 – $29,999  
D. ____ $30,000 – $34,999  
E. ____ $35,000 – $39,999  
F. ____ $40,000 – $44,999  
G. ____ $45,000 – $49,999  
H. ____ Over $50,000

6. What was your first basic annual salary after graduation? (Do not include royalty or other income)

A. ____ Under $17,999  
B. ____ $18,000 – $21,999  
C. ____ $22,000 – $25,999  
D. ____ $26,000 – $29,999  
E. ____ $30,000 – $33,999  
F. ____ $34,000 – $37,999  
G. ____ $38,000 – $41,999  
H. ____ Over $42,000

7. What is the educational background of fellow employees whose duties are similar to yours?

A. ____ Most have BS degrees in Engineering Technology  
B. ____ Most have BS degrees in Industrial Technology  
C. ____ Most have BS degrees in Engineering  
D. ____ Most have Associate degrees, but no BS degree  
E. ____ Most have no college degree of any kind  
F. ____ There are no other employees with duties similar to mine

8. Your degree program emphasized the application of practical technology and people-oriented skills instead of theoretical engineering subjects. Do you feel that this emphasis:

A. ____ Enhances your career advancement possibilities  
B. ____ Somewhat limits your career advancement possibilities  
C. ____ Severely limits your career advancement possibilities

9. Your advancement potential in your present job is: (Check only one)

A. ____ Similar to that of people with a BS in Engineering  
B. ____ Similar to that of people with an Associate degree, but no BS (Technicians)  
C. ____ Not as good as people with a BS in Engineering, but better than Technicians  
D. ____ Better than people with a BS in Engineering

10. Would you recommend the program you graduated from to a prospective student? Why or why not?

11. What did you feel were the strengths of the program?
12. What did you feel were the weaknesses of the program or is missing from the program?

13. What, if anything, would you eliminate from the program?

14. Would you be interested in pursuing a M.S. in Engineering Technology?

15. Would a M.S. in Engineering Technology enhance your current employment situation and future opportunities? If not, would a graduate certificate program be of any interest?

16. Would you be interested in continuing education courses? If so, what subjects would you like to see, and what format, such as a one week short course, a ten week night course, or some kind of distance course, would you like the courses to have?

Your assistance is appreciated. Please return this completed questionnaire and the Engineering Technology Department Alumni CORE Skills Survey in the envelope provided or to:

Jeffrey L. Newcomer, Ph.D.
Assessment Committee Chair
Department of Engineering Technology
Western Washington University
Bellingham, WA, 98225-9086
The Engineering Technology Department curricula are designed so that you graduate with strong capabilities in a number of areas. The ET Department has defined a set of CORE Skills that we believe are important for all graduates of the ET Department, and every Program also has defined a set of TECHNICAL Skills specific to graduates from that Program. We need your feedback to aid our assessment of the quality of education in the Engineering Technology Department. Please fill out the following survey regarding the ET Department CORE Skills as carefully and accurately as possible. Your help with this endeavor is greatly appreciated.

Please fill out the following table regarding the ET Department CORE Skills using the following scale:

5 – Extremely Well    4 – Very Well    3 – Well    2 – Poorly    1 – Very Poorly    0 – Not at All

<table>
<thead>
<tr>
<th>Engineering Technology Department CORE Skills</th>
<th>Level at which I believe I was prepared by the ET Department</th>
<th>Level at which I believe I should have been prepared by the ET Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Skills</td>
<td>Ability to: logically analyze and solve problems from different points of view; translate scientific and mathematical theory into practical applications using appropriate techniques and technology.</td>
<td></td>
</tr>
<tr>
<td>Oral Communication Skills</td>
<td>Ability to: verbally present ideas in a clear, concise manner; plan and deliver presentations; speak and listen effectively in discussions based upon prior work or knowledge.</td>
<td></td>
</tr>
<tr>
<td>Visual Communication Skills</td>
<td>Ability to: utilize appropriate technology to create drawings, illustrations, models, computer animations, or tables to clearly convey information; interpret and utilize similar information created by others.</td>
<td></td>
</tr>
<tr>
<td>Written Communication Skills</td>
<td>Ability to: present ideas in clear, concise, well-structured prose; choose appropriate style, form, and content to suit audience; utilize data and other information to support an argument.</td>
<td></td>
</tr>
<tr>
<td>Project Management Skills</td>
<td>Ability to: Set goals; create action plans and timetables; prioritize tasks; meet project milestones; complete assigned work; seek clarification of task requirements and take corrective action based upon feedback from others.</td>
<td></td>
</tr>
<tr>
<td>Teamwork Skills</td>
<td>Ability to: work together to set and meet team goals; encourage participation among all team members; listen and cooperate; share information and help reconcile differences of opinion when they occur.</td>
<td></td>
</tr>
<tr>
<td>Engineering Technology Department CORE Skills</td>
<td>Level at which I believe I was prepared by the ET Department</td>
<td>Level at which I believe I should have been prepared by the ET Department</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Creative Problem Solving  
   Ability to: apply a design process to solve open-ended problems; generate new ideas and develop multiple potential solutions; challenge traditional approaches and solutions. |                                           |                                           |
| Business Skills  
   Ability to: accurately estimate production costs; calculate the cost effects of alternative designs; predict the effects of quality control, marketing, and finance on product or process cost. |                                           |                                           |
| System Thinking Skills  
   Ability to: understand how events interrelate; synthesize new information with knowledge from previous courses and experiences. |                                           |                                           |
| Self-learning Skills  
   Ability to: learn independently; continuously seek to acquire new knowledge; acquire relevant knowledge to solve problems. |                                           |                                           |
| Ethics and Professionalism  
   Ability to: understand and demonstrate professional and ethical behavior; understand social and ethical implications and interrelations of work, and respond in a responsible and professional manner. |                                           |                                           |
| Programming Skills  
   Ability to: use higher level, structured programming languages to write effective and efficient code to complete a task such as modeling or calculation, or control equipment; understand and adapt existing structured programs. |                                           |                                           |
| Technology Skills  
   Ability to: properly use industrial-quality technology appropriate to field; adapt to new technology; integrate existing technology to create new possibilities. |                                           |                                           |

Please give at least three specific examples of when and how you had the opportunity to learn and practice CORE skills among your experiences in the Engineering Technology Department.
Dear Graduate,

There are many exciting things happening in the Engineering Technology Department at Western Washington University these days, and we want to share some of them with you. We also would like to ask you to please take some time to fill out and return the enclosed questionnaires. Your feedback and opinions are very important to us, especially as we plan the short and long term future for the Engineering Technology Department. There have been some changes to the department since you graduated. One of the most significant and exciting is that the department received a major grant from The Boeing Company, which has allowed us to created a modern computer engineering laboratory, using solid modeling programs such as Pro/ENGINEER, I-DEAS, IronCAD, and Rhinoceros in our introductory graphics classes. As an additional part of the grant, we have just purchased new FDM machines, a 3-D printer, and a new CNC for rapid prototyping, and we will be adding a second computer laboratory next year. There are also many interesting developments in the various programs, some of which are summarized below.

**Electronics Engineering Technology**: Several exciting developments are underway in the Electronics program. Todd Morton has developed a new course in embedded systems design, and is putting the finishing touches on a textbook for the course. Look for it early in the new millennium. Thanks to a grant from the John Fluke Corporation, there is now a modern electronics laboratory, with all instruments computer controlled using the IEEE-488 Bus, with a HP Windows NT server that was donated by Alpha Technologies. Finally, the Instrumentation course is now in the catalog, and new courses using computer controlled instruments and virtual instruments are under development. These courses were made possible due to a NSF grant that allowed the department to purchase LABVIEW software and high quality data acquisition boards.

**Manufacturing Engineering Technology**: The Manufacturing program has benefited greatly from the addition of two new faculty. Jeff Newcomer is teaching robotics, machine design, fluid power, strength of materials, and graphics. Eric McKell is responsible for the CNC lab and has temporarily picked up the teaching load that had belonged to Clyde Hackler, who retired this past January. Jeff received his Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute (RPI), as well as teaching experience at RPI and two other schools. Eric has an M.S. in Manufacturing Engineering from Brigham Young University and has worked for The Boeing Company as a Manufacturing Engineer in the Fabrication Division. He is the faculty advisor for the SME/ASME student chapter. Both Jeff and Eric are actively involved in curriculum development, and are trying innovative ways to incorporate design projects and our new rapid prototyping capability throughout the Manufacturing curriculum.

**Plastics Engineering Technology**: The Plastics program has also benefited from the addition of a new faculty member. Nicole Hoekstra received her M.S. in Mechanical Engineering from the University of Minnesota, and joins us from Upchurch Scientific, where she worked as a Project Engineer. Nicole is working to incorporate simulation software and rapid prototyping into the Plastics curriculum. Now that Nicole has joined the program, the Plastics program will begin the process of become independently accredited, with plans to eventually develop separate Plastics and Composites concentrations. Currently Plastics is an option in the Manufacturing program.
**Vehicle Research Institute:** In 1999 student teams from the Vehicle Research area of Engineering Technology entered three separate competitions. The Formula SAE team took its unique carbon fiber and CNCed aluminum vehicle to Birmingham, England to compete in the European Formula Student competition where they won the Sir Henry Royce Gold Medal for Engineering Excellence. The Viking 23 with a new and improved waterproof electrical system competed at the 1999 Tour de Sol. In the research arena, a five year, $900,000/yr. grant from the US Dept. of Defense has funded a team of research engineers at the VRI since 1995 to develop an electric generator utilizing gallium antimonide photovoltaic (GaSb) cells. Viking 29, a TPV electric hybrid car, was built by the VRI to showcase this new technology. For more information, please visit the VRI website at [http://vri.etec.wwu.edu](http://vri.etec.wwu.edu).

**Industrial Technology:** The Industrial Technology Graphics and Industrial Supervision programs are now under the guidance of David Kelley, Dr. Seal is still in charge of the Vehicle Design program. David received his Ph.D. in Technology Education from Mississippi State University, and has teaching experience from Oklahoma State University and three other schools. David’s interests include Web Enabled Engineering Collaboration, and he is currently writing a textbook on Pro/ENGINEER. David replaced Dick Vogel, who retired in 1998.

**Industrial Design:** The Industrial Design program had an exciting last year, with over 30 students attending the IDSA Western District conference and visiting firms in San Francisco last April. In addition, student internships included time at General Electric, Cheskin Research, and Cascade Designs, as well as local firms. Student design shows were held at David Suyama Architects in Seattle (seniors) and Pacific Science Center (juniors). This year’s junior class of 7 women and 5 men will be working hard to surpass those accomplishments.

**Technology Education:** The Technology Education program is pleased to announce that Western Washington University will be hosting the Washington Technology Education Association (WTEA) annual spring conference on March 23 – 25th, 2000. The conference will feature some of the new developments in the department along with seminars in the Science, Math and Technology Education Center. One of the featured seminars will be based on a new book by R. Raudebaugh and R. Beven on using middle school transportation activities to integrate the teaching of physical science and technology. The book is scheduled for Publication in April 2000 by the National Science Teachers Association.

Sincerely,

Jeffrey L. Newcomer, Ph.D.
Assessment Committee Chair
Appendix E: Senior Exit Survey (under development)

Engineering Technology Department Senior Exit Survey

Major: ___________________________  Graduation Term:  F  W  S  20______

The Engineering Technology Department curricula are designed so that you graduate with strong capabilities in a number of areas. The ET Department has defined a set of CORE Skills that faculty believe are important for all graduates of the ET Department, and every Program has also defined a set of TECHNICAL Skills specific to graduates from that Program. We need your feedback to aid our assessment of the quality of education in the Engineering Technology Department. Please fill out the following survey as carefully and accurately as possible. Your help with this endeavor is greatly appreciated.

Please fill out the following table regarding the ET Department CORE Skills.

<table>
<thead>
<tr>
<th>During my time in the Engineering Technology Department I had the opportunity to learn and practice the following CORE skills:</th>
<th>Extensively, with Instruction and Feedback</th>
<th>Often, with Instruction and Feedback</th>
<th>On and Off, with Limited Instruction</th>
<th>Occasionally, with Limited Feedback</th>
<th>Almost Never</th>
<th>Not At All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Skills</td>
<td>Ability to: logically analyze and solve problems from different points of view; translate scientific and mathematical theory into practical applications using appropriate techniques and technology.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Oral Communication Skills</td>
<td>Ability to: verbally present ideas in a clear, concise manner; plan and deliver presentations; speak and listen effectively in discussions based upon prior work or knowledge.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Visual Communication Skills</td>
<td>Ability to: utilize appropriate technology to create drawings, illustrations, models, computer animations, or tables to clearly convey information; interpret and utilize similar information created by others.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Written Communication Skills</td>
<td>Ability to: present ideas in clear, concise, well-structured prose; choose appropriate style, form, and content to suit audience; utilize data and other information to support an argument.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Project Management Skills</td>
<td>Ability to: Set goals; create action plans and timetables; prioritize tasks; meet project milestones; complete assigned work; seek clarification of task requirements and take corrective action based upon feedback from others.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
During my time in the Engineering Technology Department I had the opportunity to learn and practice the following CORE skills:

| Teamwork Skills | Ability to: work together to set and meet team goals; encourage participation among all team members; listen and cooperate; share information and help reconcile differences of opinion when they occur. | 5 | 4 | 3 | 2 | 1 | 0 |
| Creative Problem Solving | Ability to: apply a design process to solve open-ended problems; generate new ideas and develop multiple potential solutions; challenge traditional approaches and solutions. | 5 | 4 | 3 | 2 | 1 | 0 |
| Business Skills | Ability to: accurately estimate production costs; calculate the cost effects of alternative designs; predict the effects of quality control, marketing, and finance on product or process cost. | 5 | 4 | 3 | 2 | 1 | 0 |
| System Thinking Skills | Ability to: understand how events interrelate; synthesize new information with knowledge from previous courses and experiences. | 5 | 4 | 3 | 2 | 1 | 0 |
| Self-learning Skills | Ability to: learn independently; continuously seek to acquire new knowledge; acquire relevant knowledge to solve problems. | 5 | 4 | 3 | 2 | 1 | 0 |
| Ethics and Professionalism | Ability to understand and demonstrate professional and ethical behavior; understand social and ethical implications and interrelations of work, and respond in a responsible and professional manner. | 5 | 4 | 3 | 2 | 1 | 0 |
| Programming Skills | Ability to: use higher level, structured programming languages to write effective and efficient code to complete a task such as modeling or calculation, or control equipment; understand and adapt existing structured programs. | 5 | 4 | 3 | 2 | 1 | 0 |
| Technology Skills | Ability to: properly use industrial-quality technology appropriate to field; adapt to new technology; integrate existing technology to create new possibilities. | 5 | 4 | 3 | 2 | 1 | 0 |

Please give at least three specific examples of when and how you had the opportunity to learn and practice CORE skills among your experiences in the Engineering Technology Department.
Please fill out the following table regarding the course TECHNICAL Skills.

<table>
<thead>
<tr>
<th>Customized Skill 1</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customized Skill 2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Customized Skill 3</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Customized Skill 4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Customized Skill 5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Please give at least three specific examples of when and how you had the opportunity to learn and practice TECHNICAL skills among your experiences in the Engineering Technology Department.

Please list three ways in which you would improve your Program in the Engineering Technology Department to better allow you to acquire and develop CORE and TECHNICAL skills.