

Mechanical Engineering Technology BS

Demonstrate Effective Professional Communication Skills

Goal Description:

Students will develop effective professional communication skills through course activities such as written reports, team projects, oral presentations, and graphical documents.

Providing Department: Mechanical Engineering Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Effective Professional Communication Skills

Learning Objective Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, including stress and strain, deformation, and experimental tests for structural elements such as beams. Students will be able to:

- Analysis structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain, and elastic behavior of materials
- Analysis of stresses, strains, deflection, and deformation in bodies under the action of loads
- Understanding bending and shearing stresses in beams, stress and shear flow formulas, combined stresses and Mohr's circle, torsion on a circular shaft
- Perform lab experiments that relate to stresses and strain in different structures

RELATED ITEM LEVEL 2

Demonstrate Effective Professional Communication Skills

Indicator Description:

- ETEC 4376 is required for students enrolled in the Mechanical Engineering Technology program. This course addresses the strength of materials subjected to various mechanical loads with applications to the analysis of structural elements such as beams
- Students are expected to achieve a 70 or higher on a scale of 100 and standard in which $90\% \leq A$, $80\% \leq B < 90\%$, $70\% \leq C < 80\%$, $60\% \leq D < 70\%$, $F < 60\%$
- The overall grade for the ETEC 4376 Strength of Materials course is broken down as follows: Exam 1 and Exam 2 are 15% each, Final Exam is 20%, Homework assignments are 20%, and Laboratory is 30%

Criterion Description:

Homework assignments

The more in-depth assignments are given to students to practice more in different topics and to learn working on their own.

Midterm Exam

Students are assigned exam problems related to the first part of the course material.

Final exam

Students are assigned exam problems that conclude all the course material taught in class.

Lab experiments

Students perform different experiments to understand the concepts taught in class and they submit a lab report after each experiment.

Findings Description:

ETEC 4376 Strength of Materials is a senior-level course, and it was offered in Fall 2021 and Fall 2022. Since the Mechanical Engineering Technology BS is a new program (started in the Fall of 2020), only two transferred students enrolled in this course in the Fall of 2021 and eight students in the Fall of

2022. In this course, I taught the students different topics such as stress concepts (normal and shear stresses), stress and strain, torsion, pure bending, analysis and design of beams for bending, shear stresses in beams, the transformation of stress and strain, principal stresses under given loading, and deflection of beams. We had a lab part of this course where the students performed the experiments by themselves in the lab. The concepts taught in class are explained more in the lab experiments. The students are asked to write lab reports for each experiment they have in the lab.

Eight students enrolled in ETEC4376 in Fall 2022, and their performance is as follows:

Exams: first, second, and final exams (combined):

- grade A - 2
- grade B - 2
- grade C - 3
- grade D - 0
- grade F - 1

Class and homework assignments

- grade A - 5
- grade B - 0
- grade C - 1
- grade D - 1
- grade F - 1

Lab activities

- grade A - 6
- grade B - 1
- grade C - 0
- grade D - 0
- grade F - 1

These assessments show that the students performed well in hands-on activities in comparison with theoretical assessments such as exams.

RELATED ITEM LEVEL 3

Action - Communication Skills

Action Description:

It seems the students do better in the hands-on activities and classwork and homework assignments compared to in-class exams. More labs will be added to the set of experiments that we perform in the lab and more class and homework assignments, too.

Demonstrate Knowledge and Skills

Goal Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, such as mechanical design, analysis, prototyping, and testing

Providing Department: Mechanical Engineering Technology BS

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Demonstrate Knowledge and Skills

Learning Objective Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, including free body diagram, force and moment definitions, analysis of forces on a rigid body, and a couple due to moment of a force. Students receive both lecture-based training and hands-on experience designing and constructing a model bridge from scratch by applying their knowledge on the abovementioned items. Students will be able to

- examine qualitative and quantitative treatments of forces and moments
- design trusses, construct free-body diagrams, and perform equilibrium analysis for coplanar systems.
- apply force analysis extended to beams, brackets, springs, and other commonly seen structural elements in the industry.
- work collaboratively in a team to develop, test, and optimize mechanical systems such as a truss bridge

RELATED ITEM LEVEL 2

Demonstrate Knowledge and Skills

Indicator Description:

- ETEC 3375 Statics is required for students enrolled in the Mechanical Engineering Technology program. This course addresses key concepts and skills relevant to force system analysis with application to static force analysis for mechanical systems such as a bridge
- Students are expected to achieve a 70 or higher on a scale of 100 and standard in which <60 = fail, 60 ~69 = meet minimum expectations, 70~79 = satisfied, 80~89 = good, >=90 excellent. It is expected that 80% of the students evaluated will score 70 or higher
- The overall grade for the ETEC 3375 Statics course is broken down as below.
28 % – Chapter Tests, 28 % – HomeWorks, 14 % – Final exam, 30 % - Lab activities, 10% - extra credits
- The chapter tests, homework are evaluated through Pearson Mastering in Engineering tool. The final exam and class assignments (extra credits) are evaluated through in-person handwritten exams. Lab activities are evaluated every week through attendance, participation, and progress

Criterion Description:

Reading Assignments

These assignments are scheduled through the Pearson Mastering in Engineering tool integrated with Blackboard. A chapter or specific section will be assigned to students for their reading and help them prep for lectures, homework, and quizzes. Please note that this section doesn't carry any grades but is required for the completion of this course and grade.

Chapter Tutorials

Chapter Tutorials are followed by the reading assignments. These are interactive tutorials that will help you understand the concepts of a chapter through practice problems. Students can learn at their pace and can-do multiple retakes. There will be a slight penalty for every retake, but the best score will be retained for grading. These tutorials take an average of 3-4 hours per week to complete outside the class time.

Chapter Exams

These chapter exams are intended to test your knowledge of individual chapters. Mostly, these exams are multiple-choice questions and will be completed in 30-60 minutes.

Final Exam

The final exam will be comprehensive and based on the end chapter problems of chapters 2-4. It will consist of 9 questions from which the student has to answer any 4. There are no multiple retakes for this exam.

Lab activities

Project: Design and fabrication of a bridge with the predefined span and load requirement (Teamwork)

More detailed instructions about these projects will be available on the Blackboard. All lab activities are planned in Pirkle 100 and hence during Wednesdays, students and the instructor meet at Innovation Lab (Pirkle 100).

Class notes

The instructor will lecture in the class and demonstrate the solving procedure of problems. Students are highly encouraged to make the notes and must show them to the instructor during office hours. The instructor will verify your engagement in the course and will provide feedback.

Class Assignments

Occasionally, the instructor will give class assignments that are counted towards the 10% extra credit. This is to encourage class participation and there will be no retakes and due date extensions for any type of absences.

Findings Description:

The course provided students with the opportunity to apply their math skills and force estimation technique to solve engineering statics problems. The course had 21 students and their performance on various indicators is evaluated and given below.

Chapter tests

grade A - 15

grade B - 5

grade C - 1

grade D - 0

grade F - 0

Final Exam

grade A - 8

grade B - 2

grade C - 5

grade D - 4

grade F - 2

Homework

grade A - 19

grade B - 2

grade C - 0

grade D - 0

grade F - 0

This assessment shows that the students were performing well for both homeworks and exams.

RELATED ITEM LEVEL 3

Action - Knowledge and Skills

Action Description:

More emphasis was given to building the foundations in students for the necessary mathematical skills. This was proven effective in the performance of the students in the exams and homework.

This trend will be continued.

New Update to Previous Cycle's Plan for Continuous Improvement Item

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):

Closing Summary

The faculty teaching courses required by this curriculum will continue to assess the learning objectives of development and demonstration of professional communication skills and technical knowledge to ensure that all Mechanical Engineering Technology students are ready to pursue a professional career in related industries. The faculty will proactively work and support Mechanical Engineering Technology students to meet or exceed the 85% above average rating (B or higher) targeted performance criterion in the Statics and Strength of Materials courses.

Update of Progress to the Previous Cycle's PCI:

The BS in Mechanical Engineering Technology program experienced significant enrollment growth with 123 majors in Spring 2023 (it was 56 in Spring 2022). The faculty has been actively revising existing courses and developing new courses, such as HVAC and the new Simulation with SolidWorks as a Special Topic.

Resources, including new equipment, such as HVAC and fluid power trainers, lab space, instructional materials, and lab manuals, are being developed to improve the effectiveness of teaching. In addition, an assistant professor of practice is being recruited to help with the growing demand for additional courses.

New Plan for Continuous Improvement Item

Closing Summary:

Faculty in the BS in Mechanical Engineering Technology plan to continue the effort to examine and revise the program curriculum, course offering rotation plan, and pre-requisite sequence to better serve the growing students. The faculty will further develop and improve the existing labs and other related resources as well. With students graduating from the program, faculty will also discuss the plan to apply for the accreditation of the program by the Accreditation Board for Engineering and Technology (ABET).