Annual Program Report

(Bachelor)

Program: Bachelor of science in Mechanical engineering
Program Code (as per Saudi Standard Classification of Educational Levels and Specializations): Mechanical Engineering (071501)
Qualification Level: 6
Department: Mechanical engineering
College: Faculty of Engineering
Institution: University of Tabuk
Academic Year: 2023-2024 (1445-1446)
Main Location: Campus
Branches offering the program (if any): • ..... • ..... • .....

Table of Contents

A. Program Statistics

Item	Number
Number of students enrolled in the program	171
Number of students who started the program (in reporting year)	30
Number of students who completed the program	59

B. Program Assessment

1. Program Learning Outcomes Assessment and analysis according to PLOs assessment plan *

#	Program Learning Outcomes	Assessment Methods (Direct and Indirect)	Targeted Performance (%)	Assessment Results
Knowledge and Understanding				
K1	An ability to demonstrate knowledge of concepts of mechanical engineering and science	Direct: Exams, Quizzes, Assignments Indirect: Surveys, Course Evaluations	70%	80.3%
K2	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Direct: Capstone Projects, Continuous Assessments Indirect: Student Self-Assessment, Focus Groups	70%	88.5%
K3				
K...				
Skills				
S1	An ability to identify, formulate, and solve complex engineering problems by applying principles of mechanical engineering, science, and mathematics.	Direct: Problem-Solving Workshops, Design Challenges Indirect: Peer Reviews, Self-Assessment	70%	75.3%
S2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social,	Direct: Design Projects, Case Studies Indirect: Industry Feedback, Capstone Evaluations	70%	80.3%

	environmental, and economic factors.			
S3	An ability to communicate effectively with a range of audiences.	Direct: Presentations, Reports Indirect: Communication Skills Surveys, Peer Assessments	70%	86.5%
S4	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	Direct: Practical Assessments, Competitions Indirect: Feedback, Evaluations	70%	88.3%
Values, autonomy, and responsibility				
V1	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	Direct: Ethics Case Studies, Reflections Indirect: Ethics Surveys, Professional Conduct Evaluations	70%	90.3%
V2	An ability to function effectively on a team, whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	Direct: Team Projects, Leadership Roles Indirect: Peer Evaluation, Teamwork Surveys	70%	91%
V3				
V..				

*Attach a separate report on the program learning outcomes assessment results for male and female sections and each branch (**if any**).

Strengths:

1. **High Performance in Knowledge and Ethical Standards**: Students demonstrated strong knowledge of core engineering concepts (K1, K2) and high ethical standards (V1), consistently meeting or exceeding targeted performance levels.
2. **Strong Problem-Solving Skills**: PLO S1 results indicate that students effectively solve complex engineering problems, reflecting the quality of the problem-solving and design components of the curriculum.
3. **Positive Feedback from Indirect Assessments**: Indirect methods such as surveys and feedback sessions highlighted students' confidence in applying new knowledge and ethical considerations in engineering practice.

Aspects that need improvement with priorities:

1. **Enhance Application of Engineering Design (S2)**: Priority should be given to improving students' ability to apply design principles, with targeted interventions such as workshops, simulations, and design-centric projects.
2. **Improve Communication Skills (S3)**: Focus on developing students' communication skills through increased practice opportunities, presentations, and peer-reviewed assignments to meet the targeted performance.
3. **Strengthen Teamwork and Leadership (V2)**: Additional emphasis on collaborative projects, leadership training, and teamwork skills workshops will help students improve their ability to function effectively on diverse teams.
4. **Address Slight Gaps in Knowledge Areas (K1 and K2)**: While performance is generally good, enhancing the understanding of advanced mathematical and analytical tools should be a continued focus to ensure students are fully equipped for complex engineering tasks.

2. Students Evaluation of Courses

Course Code	Course Title	Number of Students Who Evaluated the Course	Percentage of Participants	Evaluation Results	Developmental Recommendations
ME212	Mechanics of Machines	28/29	96.55%	94%	1. Enforce 12-student lab cap 2. Assign weekly SO(8) homework 3. Provide topic-specific lecture notes
ME315	Mechanical Design (1)	6/6	100%	98%	1. Add more solved examples to illustrate design problems. 2. Hire TAs
ME342	Computer Aided Design	16/17	94.12%	96%	1. Review the basic material of the basic subjects in mathematics 3. Secure textbook access 4.secure the Solidwork software lisence
ME317	Mechanical Design (2)	20/21	95.24%	97%	1. Reduce sections to 30 students 2. Integrate computational challenges 3. Improve textbook access.
ME211	Mechanical Drawing and Graphics	3	20%	100%	1. Increase supervised CAD lab sessions 2. Integrate error-correction exercises 3. Solve more examples from the textbook

Course Code	Course Title	Number of Students Who Evaluated the Course	Percentage of Participants	Evaluation Results	Developmental Recommendations
ME333	Instrumentation and Measurments	9	26.5%	96%	1. Provide fluid/math refreshers 2. Secure textbook access 3. Offer English writing workshops 4. Create lab for the instrumentations and measurements
ME434	Basics hydraulic and Pneumatic systems	12	46%	95%	1. Add hands-on experiments 2. Focus on problem-solving drills 3. Assign pre-exam review tasks 4. Create lab for the hydraulic and pneumatic systems
ME444	Mechatronics 1	11	50%	95%	1. Require math refresher courses 2. Schedule revision workshops 3. Align labs with real-world applications 4. Create lab for the mechatronics.
ME231	Fluid Mechanics I	3	12.5%	95%	1. Provide detailed notes/calculus refreshers 2. Hire TAs for support 3. Advise pre-course fluid basics review
ME332	Turbomachinery I	21	45.7%	93.3%	1. Assign 3 design problems per term 3. Schedule staggered exams

Course Code	Course Title	Number of Students Who Evaluated the Course	Percentage of Participants	Evaluation Results	Developmental Recommendations
ME459	Design of Thermofluid Systems	1	25%	100%	1. Cap labs at 12 students 2. Use plagiarism detection tools 3. Repair steam plant equipment
ME454	Aircraft Propulsion Systems	9	42.9%	84.4%	1. Cap labs at 12 students 2. Use plagiarism detection tools 3. Repair steam plant equipment
ME 221	Themodynamics (1)	21	30.88%	100%	1. Hire lab technician 2. Create prerequisite review guides 3. Improve textbook accessibility
ME322	Heat transfer	32/40	80%	87.5%	1. Add 3 case studies per chapter 2. Implement unit-conversion drills
ME425	Power and Desalination Plants	6/9	66.7%	83.3%	1. Distribute design roadmaps/formula sheets 2. Repair mini- steam plant lab setups 3. Hire lab technician
ME455	Fluid Mechanics (2)	5/6	83.3%	80%	1. Review the basic material of the basic subjects in fluid mechanics 2. Add applied problem assignments

Course Code	Course Title	Number of Students Who Evaluated the Course	Percentage of Participants	Evaluation Results	Developmental Recommendations
ME314	Mechanical vibrations	3/10	30 %	100 %	1. Reduce sections to 30 students 2. Hire TAs 3. Improve textbook access.
MCEN1202	Engineering materials	18/65	27.7 %	80 %	1. Add hands-on experiments 2. Focus on problem-solving drills
ME 466	Finite element methods	9/22	40.9%	80 %	1. Review the basic material of the basic subjects in fluid mechanics, heat transfer and mathematics

3. Students' Evaluation of Program Quality

Evaluation Date:12/9/2024	Number of Participants:53
Students Feedback	**Program Response**
Strengths: • Adequate facilities are available at the university for performing religious rites • Academic advisor allows the students enough time for guidance & advice. • The infrastructure that includes the lab, and research facility provided by the program ensures safety and security with sufficient lighting and ventilation are provided in the classrooms along with Multimedia (projector) learning facilities. • Appropriate safety and firefighting measures are in place in the academic and laboratory buildings. • The Registration and Communication program is easy and efficient (including website and IT services). It also includes the orientation program, which helps fresh students at the start of their academics. • At the registration, Students easily find information about the university and its programs before course registration. • The part of Guidance and Support, Institute gives ample opportunities to improve employment skills. • The staff members are fair and supportive in their treatment of students. • The program offers ample opportunities for club activities to help students in their development with necessary pieces of training and industrial visits provided by the program to enrich their skills. • The program motivates the student to higher education and lifelong learning. • The program's Feedback and Grievance Redressal system supports Students to share their feedback on any academic activities with higher authorities. The faculty and administration are responsive to resolving the grievances of the students. • Faculty, advisors, support staff, and administration are easy to approach and available for interaction. •	• Maintain the quality of the offered services • Maintain the quality of learning experience.

Areas of Improvement: • Introduce mandatory review of the main subjects in math/physics for core courses. • Repair/upgrade lab equipment (e.g., steam plants, heat exchangers). • Repair/upgrade lab equipment (e.g., steam plants, heat exchangers). • Implement automated plagiarism checks for coding/projects.	• A pre-semester refresher course will be required for students entering core ME classes, covering essential topics in calculus, statics, and thermodynamics. • Diagnostic testing will identify individual gaps, with targeted remedial modules. • Immediate repairs of critical lab setups (steam plants, heat exchangers) will be prioritized this fiscal year. • A 5-year equipment upgrade plan will be developed, with annual budget allocations for replacements. • Automated code/project screening (via Turnitin/SafeAssign) will be implemented starting next semester.
Suggestions for improvement: • Integrate real-world problem statements from companies into senior design projects. • Require certification in CAD/FEA software (e.g., SolidWorks, ANSYS) as a graduation milestone. • Launch monthly student-faculty forums to address course challenges in real time.	• Partner with industry leaders to incorporate actual engineering challenges into senior design projects, starting next academic year. • Introduce software certification requirements (SolidWorks/ANSYS) for graduation by 2026. • Establish structured feedback sessions every 4 weeks to discuss course concerns and solutions.

4. Scientific research and innovation during the reporting year

Activities Implemented	Number
Published scientific research	23
Current research projects	4
conferences organized by the program	0
Seminars held by the program	0
Conferences attendees	2
Seminars attendees	0

Discussion and analysis of scientific research and innovation activities:

- ✓ The scientific research and innovation activities has been improved significantly. The number of papers being published has "grown exponentially,". In 2023-2024, that number had jumped to 36 research. That means that, on average, each faculty members are publishing more than 2 papers.
- ✓ Staff members and student researchers should be motivated to conduct authentic and innovative research that contributes to enriching specialized fields of knowledge and fulfill societal needs. All aiding means necessary for achievement and benefit shall be provided.
- ✓ Publish the findings of scientific and academic research through local and international scientific periodicals or journals, and provide official documentation to facilitate the researcher's task.
- ✓ Collaborate with organizations, academic and research institutes, inside and outside the Kingdom, through conducting research and exchanging knowledge and expertise.
- ✓ Provide channels that encourage individuals and institutions to support and fund research projects to promote the role played by the University.
- ✓ Provide modern mean of communication and the latest academic and scientific publications such as periodicals, books, and other literature of academe

5. Community Partnership

Activities Implemented	Brief Description*
Seminar for exit students presented by a representative of the BAE system company	Description of the BAE system company and employment opportunities therein
Career Guidance Sessions	Offer career guidance sessions to high school students, providing insights into the diverse career paths within EE/ME/CE/IE engineering. Discuss the educational requirements, potential specializations, and the real-world impact of the field.
Engineering Orientation	Orientation to help high school students in the surrounding community understanding engineering program.
STEM Workshops and Demonstrations	Conduct interactive STEM workshops to introduce basic principles. Involves faculty members guiding students in workshop design and delivery.

*including timing of implementation, number of participants, and outcomes.

Comment on community partnership activities**

The community partnership activities need improvement. Required actions should be implemented as:

- ✓ Establishing Collaborations with other Institutes, Community, Industries, and industrial advisory board within the department will enhance the consultancy project ensuring community partnership.

**including overall evaluation of the program's performance in these activities (if any).

6. Other Evaluation (if any)

(e.g., independent reviewer, program advisory committee, and stakeholders (e.g., faculty members, alumni, and employers)

The ME program was evaluated by the ABET reviewers in November 2022. The ME program Accredited to September 30, 2029.

The ME program was conditioned acrredited by the NCAAA reviewers in April 2024.

Evaluation method:ETEC/ NCAAA	Date: April 2024	Number of Participants:3

Summary of Evaluator Review	Program Response
Strengths: • The laboratories in the program are excellent for teaching purposes and contain up-to-date equipment. • Course reports provide a standardized template used across all courses in the program to summarize relevant course information.	• The program acknowledges the commendation and commits to maintaining and upgrading laboratory facilities regularly to ensure they remain state-of-the-art and support effective teaching. • The program appreciates the recognition and will continue using standardized templates to ensure consistency and clarity in summarizing course information across all courses.
Points for Improvements: • Implement a clear and publicized procedure to verify the quality and validity of its assessment methods (Recommendation 2.6). • Enforce assessments of PLOs across different courses and revise PLO's threshold criteria to avoid the simple averaging method of assessment results (Recommendation 2.2). •	• The program will develop and implement a transparent process to verify the quality and validity of assessment methods, ensuring alignment with best practices in quality assurance. • The program agrees to enforce assessments of PLOs across courses, revising the current threshold criteria to avoid simple averaging and enable better continuous improvement decisions.
Suggestions for development: • Consider performing a comprehensive study on the reasons for the low employability of its graduates and develop an action plan to increase the graduates' employability (Suggestion 2.2). • Simplify committee structures, reducing the number of committees and meetings, to ensure efficient management of the program (Suggestion 2.4). • Devise a mechanism to ensure students receive effective feedback on their weaknesses and points of strength (Suggestion 2.6). •	• The program will conduct a comprehensive study to identify factors contributing to low graduate employability and develop an actionable plan to enhance students' job market readiness. • The program will review its current committee framework, aiming to streamline structures and reduce meeting frequency to improve efficiency and resource allocation. • The program will devise a system to provide students with constructive feedback on their strengths and weaknesses, fostering their personal and academic growth.

*Attach independent reviewer's report and stakeholders' survey reports (if any).

C. Program Key Performance Indicators (KPIs)

Including the key performance indicators required by the NCAAA.

No	KPI	Targeted Value	Actual Value	Internal Benchmark	Analysis	New Target
1	Students' Evaluation of quality of learning experience in the program	4.25/5	4.3/5	4.41/5	The actual value of the measured KPI is slightly above the targeted value. It is also higher than the internal benchmark. Hence, this KPI is achieved. To attain further improvement in the future, a new target value is set at 4.5/5. Areas needing improvement include teaching methods, course content, and engagement.	4.5/5
2	Students' evaluation of the quality of the courses	4.0/5	4.25/5	3.9/5	The measured value is slightly higher than the targeted value and less than the internal benchmark. The target benchmark for the KPI is achieved. For further improvement, a new higher target is set. Areas needing improvement include course structure, assessment methods, and instructor feedback.	4.5/5
3	Completion rate	60%	46.8%	27%	The actual benchmark falls short of the target, exceeding the internal benchmark. The reason for this is poor results in some courses. More emphasis on math and mechanical design	60 %

					courses needs to be made. Furthermore, special attention needs to be given to academic advising, a feedback mechanism for student-academic advisor engagements, and students councelling.	
4	First-year students retention rate	100 %	100%	100%	The actual benchmark is 100% and the target has been achieved. The actual benchmark is equal to the internal benchmarks. A need to maintain and nurture students enthusiasm for good retention beyond the first year.	100 %
5	Students' performance in the professional and/or national examinations (Jahizia)	70%	**41.5**%	40.88%	The actual measured benchmark falls short of the target. Participation in professional exams is low. More attention should be given to encouraging students to participate in the professional exam. This includes incentivizing students participation and creating more awareness on the importance of these exams.	70%
6	Graduates' employability and enrolment in postgraduate programs	50%	34.14 %	85%	Based on the available data, the employability rates are below the target benchmark. It is, however, noteworthy that challenges remains in tracking alumni data. Improved strategies	50 %

					and better procedures to track alumni data is needed.	
7	Employers' evaluation of the program graduate's proficiency	4.25	4.5	3.63	The employer evaluation of the graduates meets the target and the internal benchmark. Soft skills and technical competencies need enhancement.	4.6
8	Ratio of students to teaching staff	20:1	18:1	19:1	The ratio of the students to teaching staff meet the target. Need for faculty expansion and workload optimization. The KPI is achieved.	15:1
9	Percentage of publications of faculty members	63 %	72%	100%	The measured value is higher than the target benchmark. Hence this KPI is achieved. The measured value is, however, below the internal benchmark. For further improvements, more support should be given to faculty members with incentives to increase research output.	77 %
10	Rate of published research per faculty member	3.05	3.54	3	The actual benchmark excceded the target and falls short of the internal benchmarks. Faculty members need more resources and motivation to increase their research output.	3.75
11	Citations rate in refereed journals per faculty member	57	61	57	The citation rate per faculty member exceed the target benchmark. Faculty members need strategies to increase the visibility and	64

					impact of their research.The KPI is achieved.	

Comments on the Program KPIs and Benchmarks results:

All the eleven (11) KPIs were evaluated to understand the progress towards the programs' goals and objectives. Of the 11 KPIs, the measured results shows that 8 KPIs were achieved with most exceeding the targeted benchmark. Three of the eleven falls short of the targeted benchmarks. Subsequently, with 72% of the KPIs achieving the target benchmarks, the department is on a healthy path of progress. New targets coupled with the implementation of all recommendations will cement this growth and ensure further improvements in the future.

D. Challenges and difficulties encountered by the program (if any)

Teaching	1. Many students face the realization that their previous academic preparation was not at the level it needed to be to perform academically at the college level. Perhaps the underprepared student may not have taken the appropriate college preparatory courses or have not taken academic courses for such a long period of time that the required information has not been retained. This means that the underprepared student will likely require remedial courses to regain or attain a base level of academic competency. These challenges can be extremely stressful for students and can often be the reasons that lead to student attrition. Identifying and understanding these challenges students face is a key component of the ME program. Helping students work their way through these obstacles can be both rewarding and difficult. 2. Extreme weakness of students in English and mathematics as a direct result of the weakness of public education. This Has a severe impact on the level of graduates. A need to encourage students to study English language courses and not admit students with low scores in mathematics and physics.
Assessment	1. Assessment should be made computer-based via software. 2. New faculty members should be oriented through workshops to perform assessments properly.
Guidance and counseling	1. High student number is assigned to each academic advisor. 2. Advisors have no authority on student registration.
Learning Resources	1. Students are more likely to perform well in conditions that are conducive to learning, so a program that provides these kinds of environments will be more successful in attracting students. Lack of this will affect students' performance and their academic level 2. No advanced ME labs are available.

	3. computer labs should be set up to allow small group discussions or collaborative learning. 4. The number of students in the lab sometimes exceed 15 students. This Affects the student's academic achievement. The program should divide the lab with more than 12 students into many groups. 5. Maintenance of the equipment requires attention by hiring lab. technicians. Maintenance policies should be implemented.
faculty	1. Most of the teaching faculty are occupied with administrative and official duty out of the department, they engaged with different work other than teaching. This will distract them, and they will not get enough time to focus on teaching duties. The need to provide enough number to do the administrative and technical work. 2. ME faculty members should be encouraged to apply for academic promotion, both financially and equipment-wise.
Research Activities	Research space (specialized laboratories) and time should be allocated for ME faculty members.
Others	

E. Program Development Plan

No.	Priorities for Improvement	Actions	Action Responsibility
1	Completion Rate	• Enhance Academic Advising • Improve Course Scheduling & Flexibility • Provide Academic Support Programs	Academic Affairs, Advising, and Extracurricular Activities Committee Chair of Department
2	Students' Performance in Professional and/or National Examinations	• Organize exam preparation workshops and mock exams to familiarize students with the format and content of professional/national exams • Establish a mentorship program where senior students or alumni who have excelled in these exams guide and mentor current students Integration of Exam Topics into Curriculum • Performance Tracking	Academic Affairs, Advising, and Extracurricular Activities Committee Course Instructors Academic Accreditation & Development and Quality Committee
3	Graduates' Employability and Enrolment in Postgraduate Programs	• Establish a Career Development Center to provide career counseling, resume building, interview preparation, and job placement services • Strengthen partnerships with companies to create internship and job placement opportunities • Provide guidance and support for students interested in pursuing postgraduate studies, including information on scholarships, application processes, and research opportunities	Alumni Affairs and Labor Market Needs Committee Graduate Studies, Scientific Research & Society Services Committee

		• Create an alumni network to facilitate job referrals and career advice	
4	Learming ressources	• Encourage the use of more simulation tools • Acquire the licence for the needed relevant simulation tools	Instructors Learning facilities & laboratory committee Department head
5			
6			

- Attach any unachieved improvement plans from the previous report.
- The annual program report needs to be discussed in the department council

F. Approval of Annual Program Report

COUNCIL / COMMITTEE	ME Council
REFERENCE NO.	ME council No.4 , 1446/03/12
DATE:	1446/03/12