



Shaqra University
College of Engineering
Mechanical Engineering Department



Mechanical Engineering Department

Booklet

جامعة شقراء
Shaqra University



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Shaqra University

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Mechanical engineering is one of the oldest engineering specializations starting with the existence of the human being. It is the logic of our different daily activities at the home, streets, and work. Even the motion of our bodies has a mechanical basic that is considered in bones movements, blood flows, surgery, and other medical activities. With the development in all sectors, seen nowadays, mechanical engineering had branched to many sub-specializations for the huge developments and expansion. Now the main branching of mechanical engineering includes on one side the thermal and fluid specialization and the production and design on the other side. The thermal and fluid branch is interested in the applications of boilers, steam power plants, car engines, airplanes engines, air compressors, refrigeration and air conditioning, solar energy thermal applications of heating and power generation, water desalination, and other unlimited applications. The production and design branches are interested in the applications like metals and materials production including from the needle to the rockets and space facilities, cars and airplanes bodies and external geometries, the machines manufacturing of all types, and other unlimited applications. All the specializations of mechanical engineering lie under these two main branches. Accordingly, the department of mechanical engineering in the college of engineering at Shaqra University introduces these two main specializations to cover both branches of mechanical engineering.

1. Overview of the Mechanical Engineering Program

The College of Engineering in Al-Dawadmi was established based on the decision of the Council of Ministers based on the decisions of the Higher Education Council at its forty-eighth session in 1429 AH under the umbrella of King Saud University, and then the college moved to Shaqra University after the decision to establish the university on Monday 3/9/1430 AH corresponding to 4/8/2009 AH. The College of Engineering received its first batch of its students at the beginning of the academic year 1430 AH, and it continues to attract distinguished students in all the disciplines. The department consists of several tracks that the student joins in the last academic year after fulfilling the department's conditions, which are:

- Energy and Thermal Engineering track.
- Production engineering and manufacturing processes track.

The Department of Mechanical Engineering offers the BSc. program in Mechanical Engineering in several tracks that seek to:

- Providing the student with broad knowledge in the field of mechanical engineering and its various paths such as energy, thermal and production engineering.
- Providing the student with the necessary practical skills in the fields of engineering by providing a university environment that helps creativity, leadership, and communication skills for the student.
- Consolidating the student's values and principles by establishing a close relationship between the academic team and the student and working on presenting topics, for example, to raise awareness of the ethics of the profession.

2. College of Engineering Vision and Mission

College of Engineering Vision

Leadership locally and internationally in the fields of engineering education, innovative research and knowledge dissemination.

College of Engineering Mission

Preparing competitive engineering cadres to keep pace with the continuous development in the engineering field, support scientific research, and enhance community partnership to contribute effectively to the sustainable development of society.

3. Mechanical Engineering Department Vision and Mission

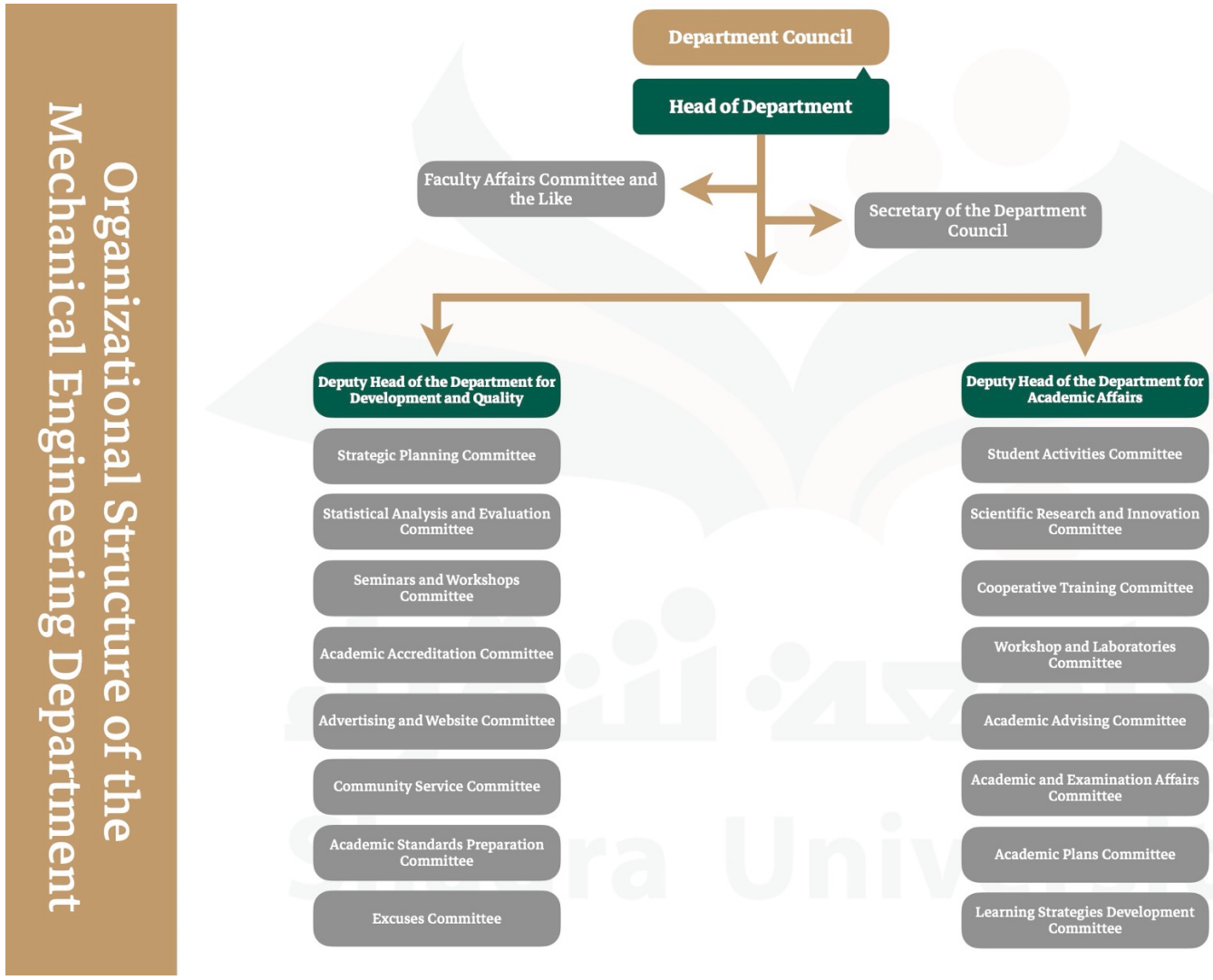
Mechanical Engineering Department Vision

Leadership locally and internationally in the fields of engineering education, innovative research and knowledge dissemination.

Mechanical Engineering Department Mission

Preparing competitive engineering cadres to keep pace with the continuous development in the engineering field, support scientific research, and enhance community partnership to contribute effectively to the sustainable development of society.

4. Organisational Structure



5. Program Educational Objectives (PEOs)

The graduates of the mechanical engineering program will:

PEO-1: Apply the learned fundamental concepts of mechanical engineering to find innovative solutions in solving engineering problems in real life.

PEO-2: Utilize various numerical, practical and technical skills for the analysis, design and implementation of creative solutions in the field of mechanical engineering.

PEO-3: Communicate effectively and work in teams that are required for leadership positions and successful participation in multi-disciplinary teams.

PEO-4: Be interested in lifelong learning skills and awareness of professions.

6. Mechanical Engineering Program Strategic Goals

Goal-1: Developing the mechanical engineering program by advancing the quality and efficiency of teaching and learning.

Goal-2: Continuous development of the skills and capabilities of the faculty members in the mechanical engineering program and motivating them.

Goal-3: Graduating distinguished students equipped with scientific theories, practical and interactive skills, and creative and competitive capabilities to cope with changes in the labor market.

Goal-4: Developing the local community by enhancing the community partnerships in the field of mechanical engineering.

Goal-5: Directing the scientific research to meet the development requirements in the Kingdom of Saudi Arabia and linking the research topics to the society needs.

7. Students Outcomes (SOs)

The graduated students from the mechanical engineering program (BSc) must demonstrate the following outcomes:

- SO1:** An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- SO2:** 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, environmental, and economic factors.
- SO3:** An ability to communicate effectively with a range of audiences.
- SO4:** An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which should consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- SO5:** 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.
- SO6:** An ability to develop and conduct appropriate experiments, analyze and interpret data, and use engineering judgment to draw conclusions.
- SO7:** An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

8. Admission and Registration Regulations:

A. Student Admissions:

I. Admission of Fresh Students:

The general requirements for admission to Shaqra University can be listed as below:

- The new student should be a holder of a secondary school certificate or its equivalent from Saudi Arabia or other country.
- Student should not have obtained a high school or equivalent for more than five years. While, the university council may exempt from this condition if there are convincing reasons.
- Student should have a good behavior registry.
- Student should successfully pass any personal interview or test that the University Council requires.
- Student should be medically fit.
- Student should obtain his approval for study if he works in any governmental or private organization.
- Student should meet any other conditions determined by the University Council at the time of submission.

According to the admission of freshmen, the University Council determines on the proposal of the College Council the number of students who can be admitted in the next academic year. If there are excess in the applicant's number, the selection is done according to their grades in the general secondary certificate, personal interview and admission tests (if found). In addition, the result of the general capabilities test, which is prerequisite for all applicants, is considered.

The ratio of each applicant is calculated as follows: 40% of the general cumulative average for the secondary year, 30% for the general capabilities test and 30% for the acquisition test score.

It is worth mentioning that the specialization in the College of Engineering, Shaqra University requires that the student passes successfully all the courses of the curriculum for the full preparatory year with rate to be at least (4).

II. Admission of International Students

The admission process for international students is somewhat as same as national ones with addition of the following:

- To pass the requirement scores of both capabilities and acquisition tests.
- The equivalent cumulative ratio (40% secondary - 30% capabilities - 30% acquisition) should be a total higher than 85 degrees.
- Not to exceed 25 years of age.
- The student must be a regular resident in the Saudi Arabia.

B. Students Transfer:

I. Transfer from Other Universities

The student may, upon the approval of the head of the department and the dean of the college in Shaqra University, accept his transfer from outside the university according to the following rules:

- The student has studied at a recognized college or university.
- The student should not be separated from the University for Disciplinary Reasons.
- The student has spent at least two semesters at the university from which he wishes to transfer, provided that the number of study credit hours recorded in his academic record is not less than (24) hours.
- The student has at least the cumulative rate of conversion at (3.75) of (5.0).

- The student should study at Shaqra University at least 60% of the graduation requirements.
- The student must apply for transfer before the beginning of the semester at least five weeks.

II. Transfer from College to Another within the University

After the approval of the head of the department and the dean of the college in Shaqra University, accept his transfer from according to the following rules:

- Student must have spent at least one semester in the college that he wants to transfer from with at least (14) credit hours.
- Student should not be interrupted, delayed or apologized for the study from the college from which he wishes to transfer.
- Student's GPA should not be less than the limit determined by the College Council and should not be less than (2 of 5).
- Transfers between university faculties are permitted only twice during the entire period of university study.

III. Transfer from One Specialization to Another within the College

After the approval of the Dean of the College, the student may transfer from one specialization to another within the College according to the following rules:

- Completion of entry requirements for the specialization to be transferred to.
- Not violating the capacity of the department.
- The student has spent at least one semester in the specialization in which he wishes to transfer with 14 credit hours.
- The student should not be interrupted, delayed or apologized for the study from the specialization in which he wishes to transfer.

C. Courses Transfer:

The College Council should compare the courses studied by the student outside the university on the recommendation of the departments that provide these courses. The student's academic record should be confirmed in the student's academic records, and should not be included in the calculation of his cumulative average according to the following rules:

- The student has studied at a recognized college or university.
- The number of hours studied by the student in the course he wants to equal should be equal to or more than the number of hours spent at Shaqra University. This rule may be to consider exceptions by a maximum of one hour.
- The content of the material studied by the student must be identical to the content of the material in the Shaqra University by not less than (70%).

D. Student Visiting:

Additionally, the transfer courses can be done for the visiting students. The visiting student is defined as the student who is studying some courses in another university or in a branch of the university to which he belongs without transferring him. His credit hours can be calculated according to the following rules:

- The acceptance of the department, the faculty and the grant acceptance and registration to allow the student to study as a visiting student.
- To be studied at a recognized college or university.
- The course topics being taught by the student outside the college are equivalent to the course topics in his college by 70% or more.

- The maximum number of academic credit hours outside the university is 25% of the total number of credit hours required to graduate from Shaqra University.
- The number of credit hours for the course which the student has studied outside the university should be equal to or more than the number of credit hours in Shaqra University.

E. Attendance and Apology for the Study:

I. Attendance Rules

- The regular student must attend lectures and practical lessons. He is prohibited from entering the final exam if his attendance is less than the percentage determined by the university council, but not less than (75%) of the lectures and practical lessons specified for each course during the semester.
- A student who has been prohibited from entering the final exam, is considered to be failing in the course and his final degree will be denied (DN)
- The College Council or its authorized representative may exclude the prohibition and allow the student to enter the test. But the student must present an excuse accepted by the Council. The University Council shall determine the attendance rate, not less than (50%) of the lectures and practical courses specified for the course.
- The student who misses the final test is zero in that test. His final result is calculated from his quarterly work degrees.

II. Apology Rules

A student may withdraw with the excuse of one or more courses during the semester with the following rules:

- The number of remaining credit hours shall not be less than 12 hours. If he presents an acceptable excuse to the Dean of the College at least three weeks before the start
- of the final tests.
- A student may apologize for continuing to study a semester without being considered a failing student if he presents an acceptable excuse to the body determined by the university council. His final grade will be (W). The apology semesters must not exceed two consecutive semesters or three non-consecutive semesters.

F. Withdrawal from University

The student may withdraw from the university after completion of the procedures of removing the university from the university and return the university card and bring his identity papers to return the original file. The withdrawal from the university shall entail the following:

- The period during which the student withdraws from the university shall be calculated as if he were not studying.
- The rewards of the withdrawn student shall be suspended from the semester until he registers for another semester.
- The student must be evacuated from the residence, the library and other university facilities.
- The student is considered to be withdrawn from the university and he has the right to re-enroll if he required in a period not exceeding four semesters or two academic years.

- The student may apply for postponement of the study for an excuse acceptable to the body determined by the University Council, provided that the postponement does not exceed two consecutive or three semesters.

G. Graduation Requirements

The Admission and Registration Deanship Office of the University is responsible for ensuring that graduating students have met all graduation requirements which can be classified as below:

I. First Year

The preparatory year aims at enhancing the skills of the student through intense English courses and courses that improve their communication and computer skills. The preparatory year is 31 credit hours.

II. Course Requirements

After successfully passing the preparatory year (31 credit hours) and to complete the graduation requirements for a B.S. in Mechanical Engineering, the students are required to successfully pass a total of 136 credit hours

III. Senior Design Project Requirements

According to the senior design project requirements, the design project is divided into two parts (2 credit hours each). The student is eligible to register for Senior Design Project (1) if he completes successfully at least 100 credit hours excluding preparatory year. Senior Design Project (2) can be taken during the first and second semesters only (not during summer semester).

IV. Summer Training Requirements

Prior to graduation, after completion of at least 100 credit hours, each Mechanical Engineering major must complete an approved Engineering Summer Training Program. Summer training extends over a period of 10 weeks excluding weekends and official holidays, and must be undertaken in companies or establishments accepted by the college. The student's performance is evaluated by the training company and by both.

9. Staff Members

The faculty members working in the Mechanical Engineering department have MSc./PhD from highly qualified international Universities with teaching experience from different countries. The department has eight faculty members of which two associate professors, five assistant professors, and one instructor.

1. Dr. Adel Khalid Fandi Alblawi - Associate Professor

Degree	Discipline	Institute	Year
PhD	Systems Engineering	Southern Methdiest University,USA	2016
MSc	Systems Engineering	Southern Methdiest University,USA	2011
BSc	Mechanical Engineering	University of Toledo,USA	2008

2. Dr. Mohamed Ali Abdelaziz Essa - Associate Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	Polytechnic university of Valencia, Spain	2012
MSc	Mechanical Engineering	Polytechnic university of Valencia, Spain	2009
BSc	Mechanical Engineering	Faculty of engineering, Zagazig University, Egypt	2004

3. Dr. Hassan Abdulrahman H Khayyat - Associate Professor

Degree	Discipline	Institute	Year
PhD	Construction Engineering	Cardiff University, United Kingdom	2008
MSc	Mechanical Engineering	Cardiff University, United Kingdom	2003
BSc	Mechanical Engineering	King Abdelaziz University, Kingdom of Saudi Arabia	1996

4. Dr. Haitham M Alswat - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	University of Manchester, United Kingdom	2020
MSc	Mechanical Engineering	University of Manchester, United Kingdom	2015
BSc	Mechanical Engineering	Umm Al-Qura University, Kingdom of Saudi Arabia	2011

5. Dr. Yousef Atteyh S Alqurashi - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	Birmingham University, United Kingdom	2020
MSc	Mechanical Engineering	Sheffield University, United Kingdom	2015
BSc	Mechanical Engineering	Umm Al-Qura University, Kingdom of Saudi Arabia	2011

6. Dr. Mohamed Asfer Mohamed Athar - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	Indian Institute of Technology Kanpur, UP, India	2015
MSc	Mechanical Engineering	Indian Institute of Technology Kanpur, UP, India	2007
BSc	Mechanical Engineering	Indira Gandhi Institute of Technology, India	2003

7. Dr. Elsayed Ibrahim Abdelaziz Hashash - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Materials Engineering	Faculty of engineering, Zagazig University, Egypt	2015
MSc	Materials Engineering	Faculty of engineering, Zagazig University, Egypt	2009
BSc	Mechanical Engineering	Faculty of engineering, Zagazig University, Egypt	1999

8. Dr. Palanivel R - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	Anna University, India.	2013
MSc	Mechanical Engineering	Anna University, India.	2009
BSc	Mechanical Engineering	University of Madras, India.	2004

9. Dr. Mansoor Nasser S Alruqi - Assistant Professor

Degree	Discipline	Institute	Year
PhD	Mechanical Engineering	University of Nottingham, United Kingdom	2021
MSc	Mechanical Engineering	University of Nottingham, United Kingdom	2016
BSc	Mechanical Engineering (Production and Mechanical Systems Design)	King Abdelaziz University, Kingdom of Saudi Arabia	2010

10. Laboratories:

The labs serve the needs of the courses offered in both the energy and thermal track and the production and design track. The labs are as follows:

- Engineering Workshop
- Renewable Energy Lab
- Fluid Mechanics Lab
- Mechanical Measurements Lab
- Materials Test Lab
- Thermodynamics And Heat Transfer Lab
- Airconditioning And Internal Combustion Engine Lab

A. Engineering Workshop

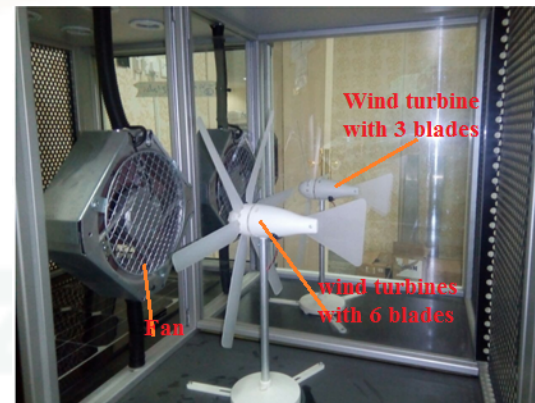
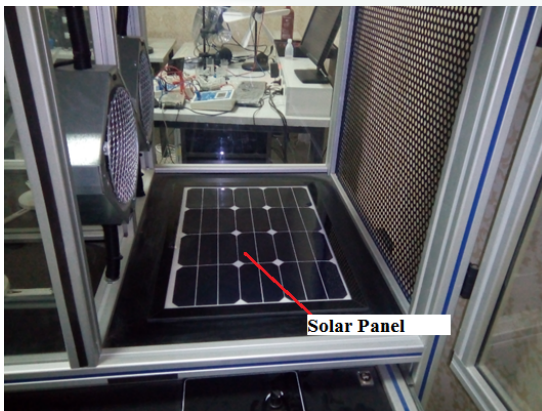
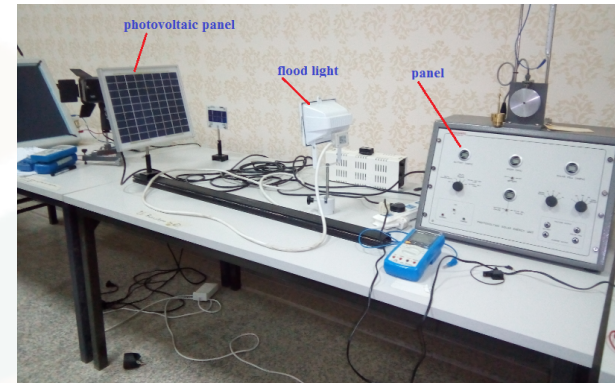
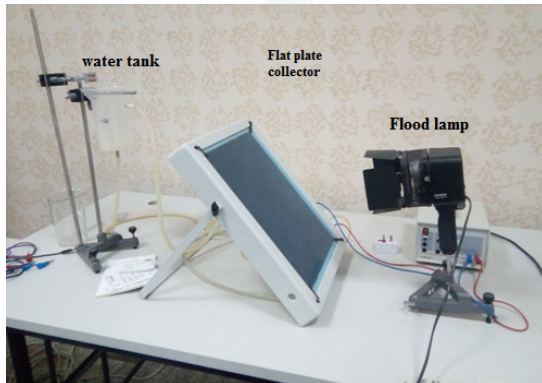


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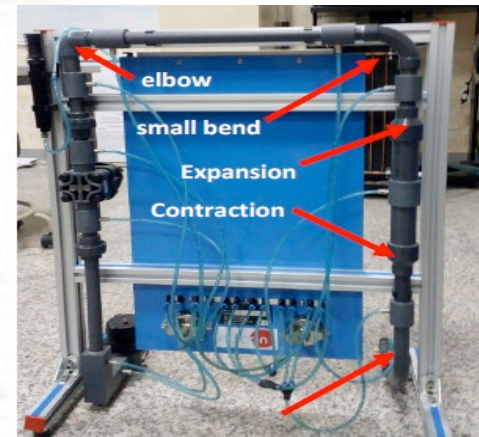
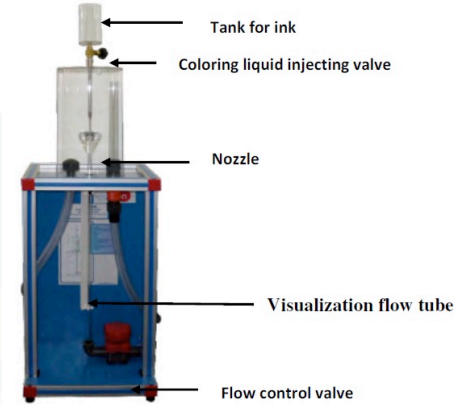
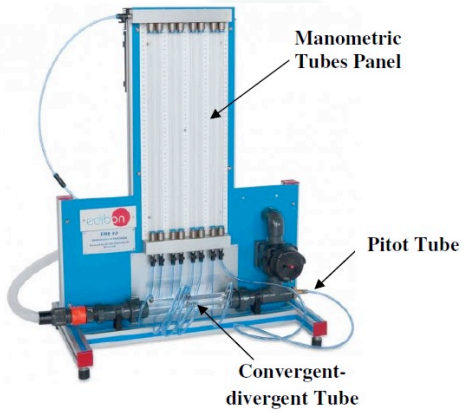
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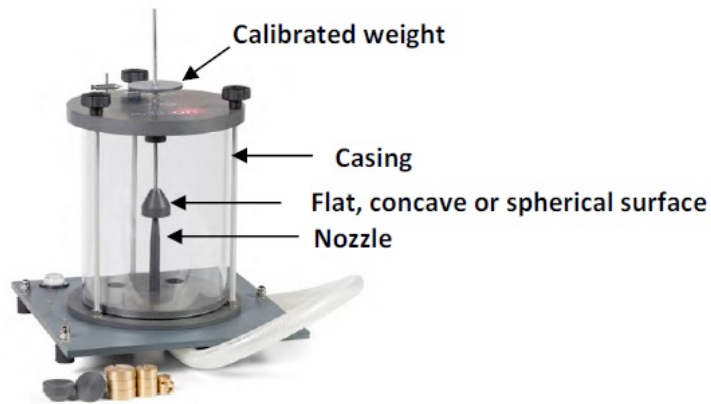
B. Renewable Energy Lab





C. Fluid Mechanics Lab



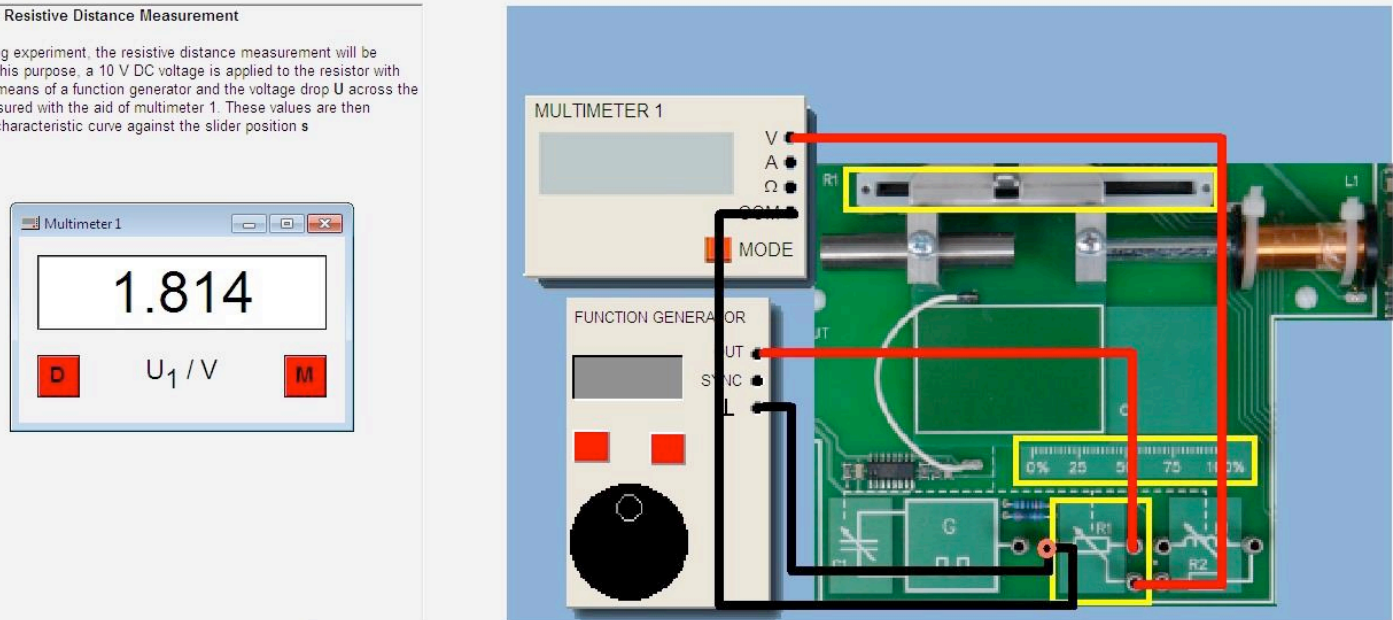


D. Mechanical Measurements Lab

Distance Measurement

Experiment: Resistive Distance Measurement

In the following experiment, the resistive distance measurement will be studied. For this purpose, a 10 V DC voltage is applied to the resistor with slider R1 by means of a function generator and the voltage drop U across the slider is measured with the aid of multimeter 1. These values are then plotted as a characteristic curve against the slider position s



Multimeter 1 display: 1.814 U_1 / V

Function Generator display: 10V DC

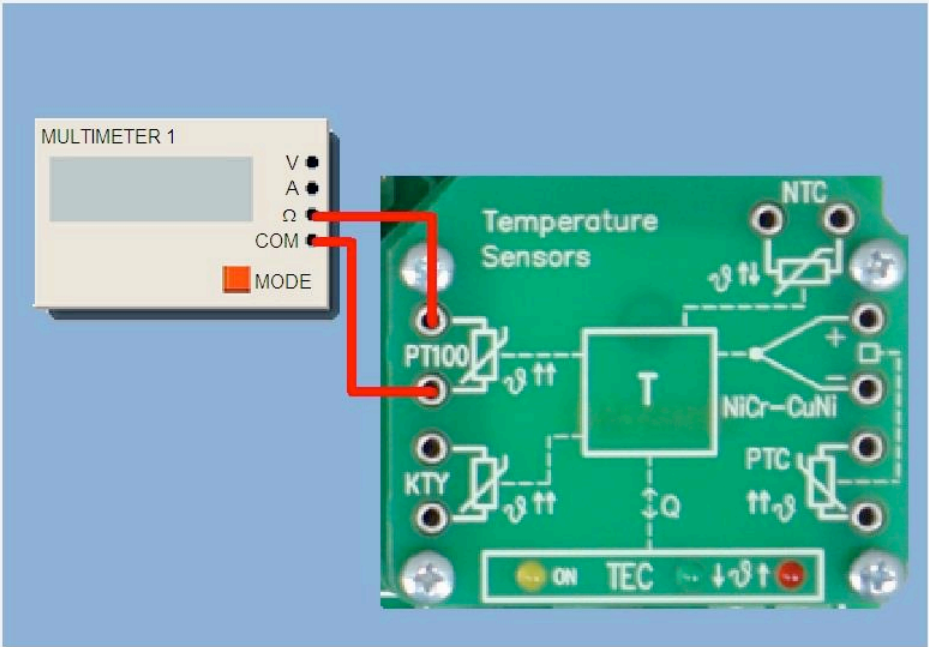
Text: Set up the experiment as shown above. The function generator and multimeter adjustments are done automatically. Select the ► button to display the next page.

Sensor Technology

Temperature Measurement with Metallic Resistance Thermometers

Experiment: Characteristic Curve of a Pt100 Sensor

In the following experiment, the characteristic curve of the Pt100 sensor integrated in the COM3LAB Board should be recorded. For this purpose, the entire temperature range producible with the Peltier element (approx. 20 – 60 °C) is automatically covered and the corresponding resistance value is plotted against temperature. The resistance measurement is done with multimeter 1.



Set up the experiment as shown above, open the multimeter 1 and set it to resistance measurement mode. Select the ► button to display the next page.

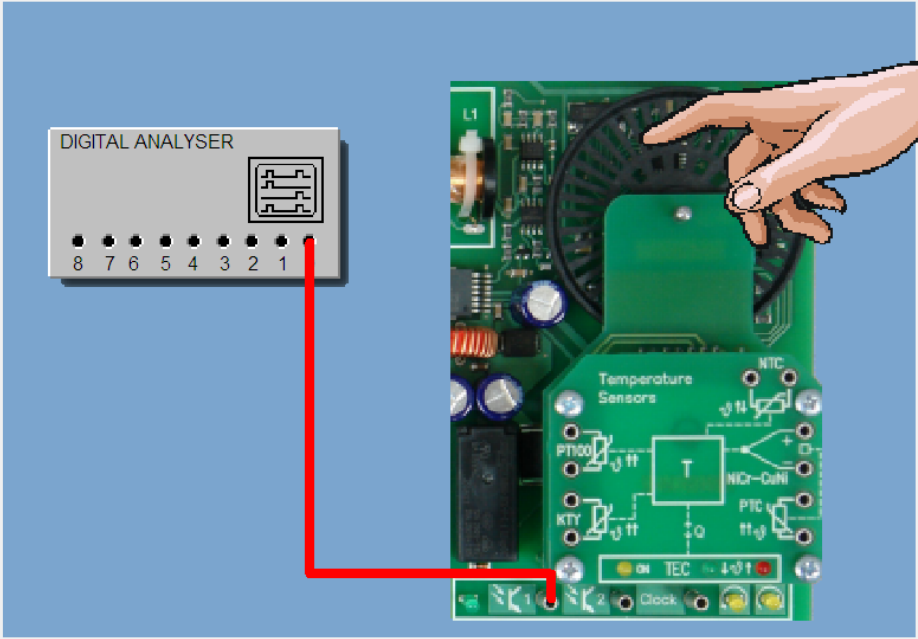
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11/30/2019

Sensor Technology



Angle and Rotational-Speed Measurement

Experiment: Optical Rotational-Speed Measurement

In the following experiment, the rotational-speed measurement will be qualitatively tested by means of an optical incremental encoder. For this purpose, the black spoked wheel is manually rotated to different speeds. The pulses generated by the optical sensor can be picked-up at socket 1 and visualised with the digital analyser.



The diagram illustrates the experimental setup. On the right, a green PCB contains an optical incremental encoder with a black spoked wheel. A hand is shown manually rotating the wheel. A red wire connects the encoder's output to socket 1 of a digital analyser. The digital analyser is a grey device with eight sockets labeled 1 through 8. A waveform is visible on the screen of the analyser.

This experiment has already been done. If you want to repeat this page, please press the  button.
Click the  button to go to the next page.

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12/2/2019

Sensor Technology

Force and Torque Measurement

Experiment: Force Measurement

Multimeter 1

1.813

U_1 / V

Set up the experiment as shown above. Set the measuring amplifier to an amplification of 500 and the constant-current source to a current of 1 mA. Execute a zero-point adjustment. Select the ► button to display the next page.

MULTIMETER 1

- A
- Ω
- COM
- MODE

9:39 PM

Sensor Technology

Pressure Measurement

Experiment: Pressure Measurement

In the following pressure sensor connections is...
other input is le...
manometer is c...
piezoelectric vo...
to multimeter 1

Multimeter 1

1.813

D U_1/V **M**

MULTIMETER 1

V
A
 Ω
COM
MODE

Δp
 ΔU

ΔU
AGPS
5000 1 5
500 100
200 100

Set up the experiment as shown above, set the measuring amplifier to an amplification of 200 and execute a zero-point adjustment. The multimeter adjustment is done automatically.
Select the **▶** button to display the next page.

7.5
9:38 PM

Sensor Technology

Light Measurement

Experiment: Light Measurement with Photodiode

In the following experiment, the characteristic curve of a photodiode should be recorded. As light source we use a light-emitting diode which is fed with a variable current. The photodiode operates in open-circuit (i.e. under no load). The photodiode open-circuit voltage is plotted as a function of the LED supply current.

MULTIMETER 1

V
A
 Ω
COM
MODE

Multimeter 1

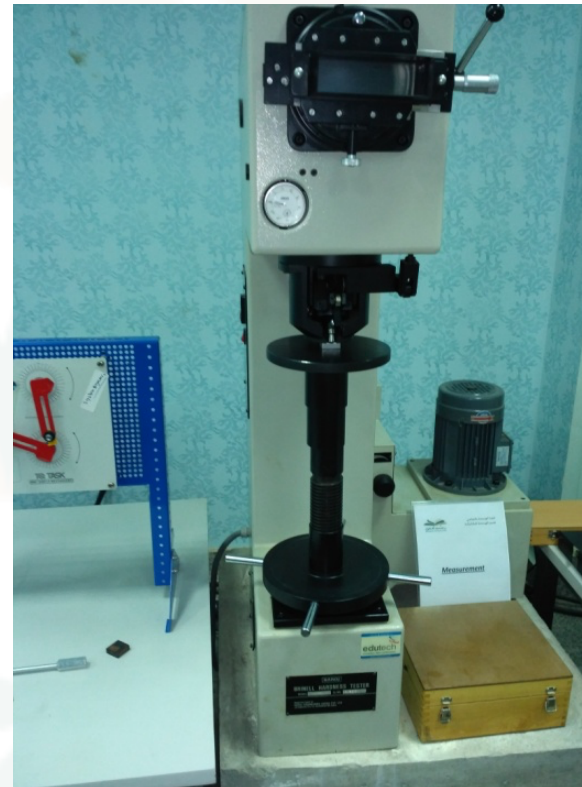
0.000

D U₁ / V M

Set up the experiment as shown above. The multimeter adjustment is done automatically. Select the ► button to display the next page.

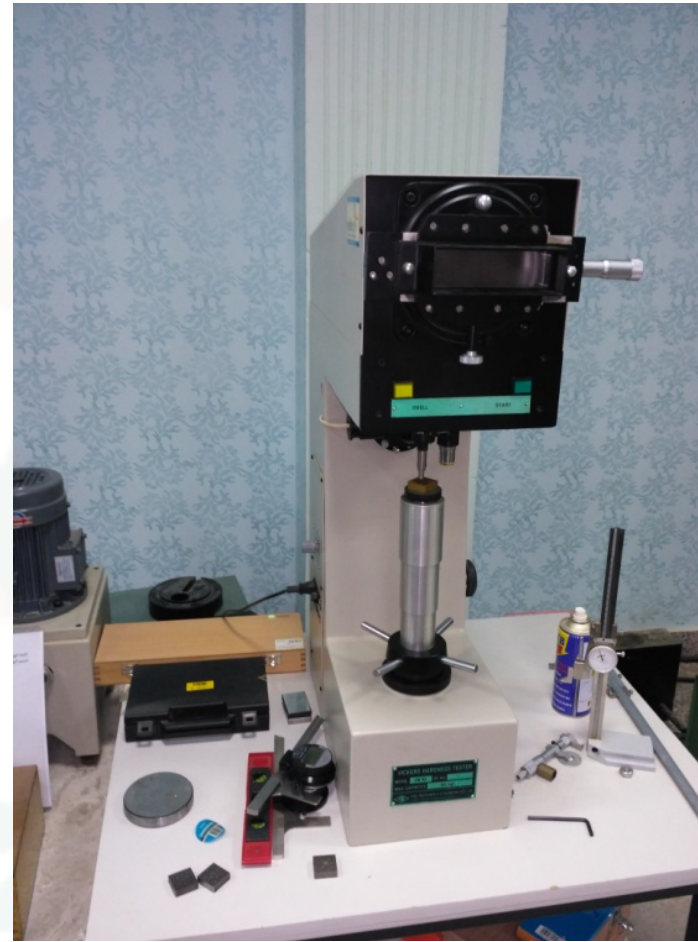
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E. Materials Test Lab





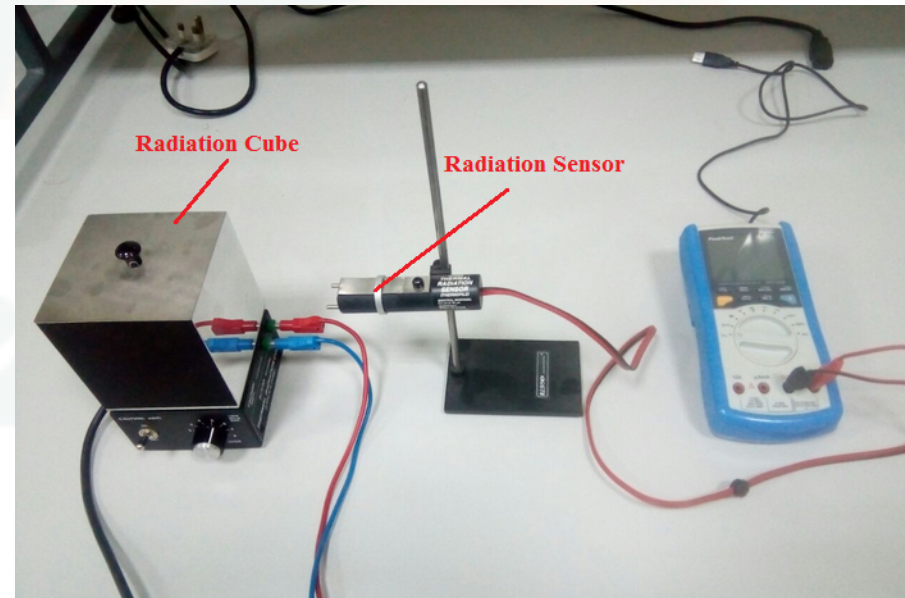
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جامعة شقراء
Shaqra University



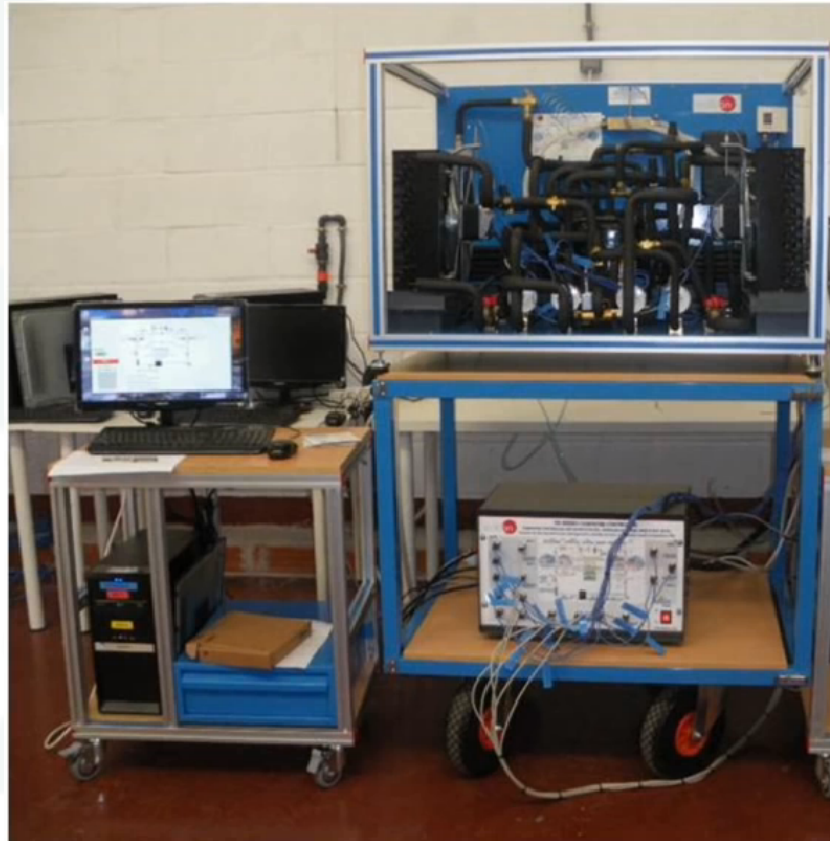
F. Thermodynamics And Heat Transfer Lab





Shaqra University

G. Airconditioning And Internal Combustion Engine Lab



Mechanical Engineering Department Team

