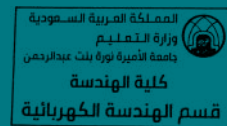جامعـة الأميـرة نورة بنت عبدالرحمن
Princess Nourah bint Abdulrahman University

Laboratories Guide

Electrical Engineering Department

This document presents guidelines for all the final year students conducting their co-op training for all College of Engineering programs at Princess Nourah bint Abdulrahman University.

1445-2024

المملكة العربية السعودية
وزارة التعليم
جامعة الأميرة نورة بنت عبدالرحمن
كلية الهندسة
قسم الهندسة الكهربائية

Contents

Message from head department:

The world is witnessing rapid and continuous development, as if it were a small village managed by various technologies. Essential to this progress are electronics, communications, and energy, so educational institutions strive to keep pace with these changes and seek to lead the forefront in the quality of outputs. This commitment is aimed at effectively shaping global leadership and steering it toward a sustainable tomorrow.

Within the College of Engineering, the Department of Electrical Engineering offers three modern programs that keep pace with global developments in the field: Electronics Engineering, Communications Engineering, and Renewable Energy Engineering.The department is committed to excellence in teaching, adopting the latest teaching and learning strategies, fostering a sense of responsibility, and opening horizons for its engineers towards excellence and innovation. These programs aim to meet the requirements of the job market and align their outputs with the era of the knowledge economy, addressing some of the human development needs.

The Electrical Engineering Department was established in the year 1439. The credit hours the programs: Electronics Engineering,Communications Engineering, and Renewable Energy Engineering consists of 158, 158, and 162 study units respectively which lead to a Bachelor's degree in Electrical Engineering. Students enrolled in these academic programs undertake all specialized courses in the English language. The programs aim to prepare competent female electrical engineers who are able to contribute effectively academically, research and society.

The department not only offers undergraduate engineering programs, but also provides an electronics technician diploma program. Additionally, it participates in a bachelor's program in the Internet of Things (IOT) with the College of Computer and Information Sciences at Princess Nourah bint Abdulrahman University.

The department includes modern teaching and research laboratories equipped with the latest equipment, covering all fields of electrical engineering. The department is witnessing a research activity among its male and female faculty members and students, making it one of the most productive departments in research and registration of patents.

The department places equal emphasis on its graduates as it does on its students, ensuring that the programs are tailored to prepare and equip engineers for promising career opportunities in the fields of energy, sustainability, military industries, and security sectors.

Dr. Amal Beqeis
Head of Electrical Engineering Department

About the Electrical Engineering Department

The Department of Electrical Engineering was established in the year 1439 in line with the Saudi Vision 2030 to increase women's participation in the job market, especially the engineering sector. The department aspires to be a leading model in qualifying female engineers locally and globally. The Electrical Engineering Department offers three programs: Electronics Engineering, Communications Engineering, and Renewable Energy Engineering.

Vision

Excellence in electrical engineering and scientific research and enhancing and endorsing social responsibility and sustainable development.

Mission

Prepare highly qualified femele electrical engineers who are capable of competing effectively, both locallyand globally,by providing them with a comprehensive academic environment that aims to develop their knowledge and skills, supports innovation and scientific research , in order to contribute to the attainment of national goals of sustainable development and community service.

Goals

- Provide renewed educational programs in electrical engineering fields, which keep pace with the latest technologies ,ensuring quality and efficiency in teaching and learning, to graduate distinguished female engineers capable of competing in the job market.
- Support innovation and countinuous development in scientific research in the field of electrical engineering to serve the community and achieve the sustainable development goals.
- Promote social responsibility and volunteer work through communication and collaboration with community organization.
- Promote the values of significance of integrity and and professional ethics in the electrical engineering fields.
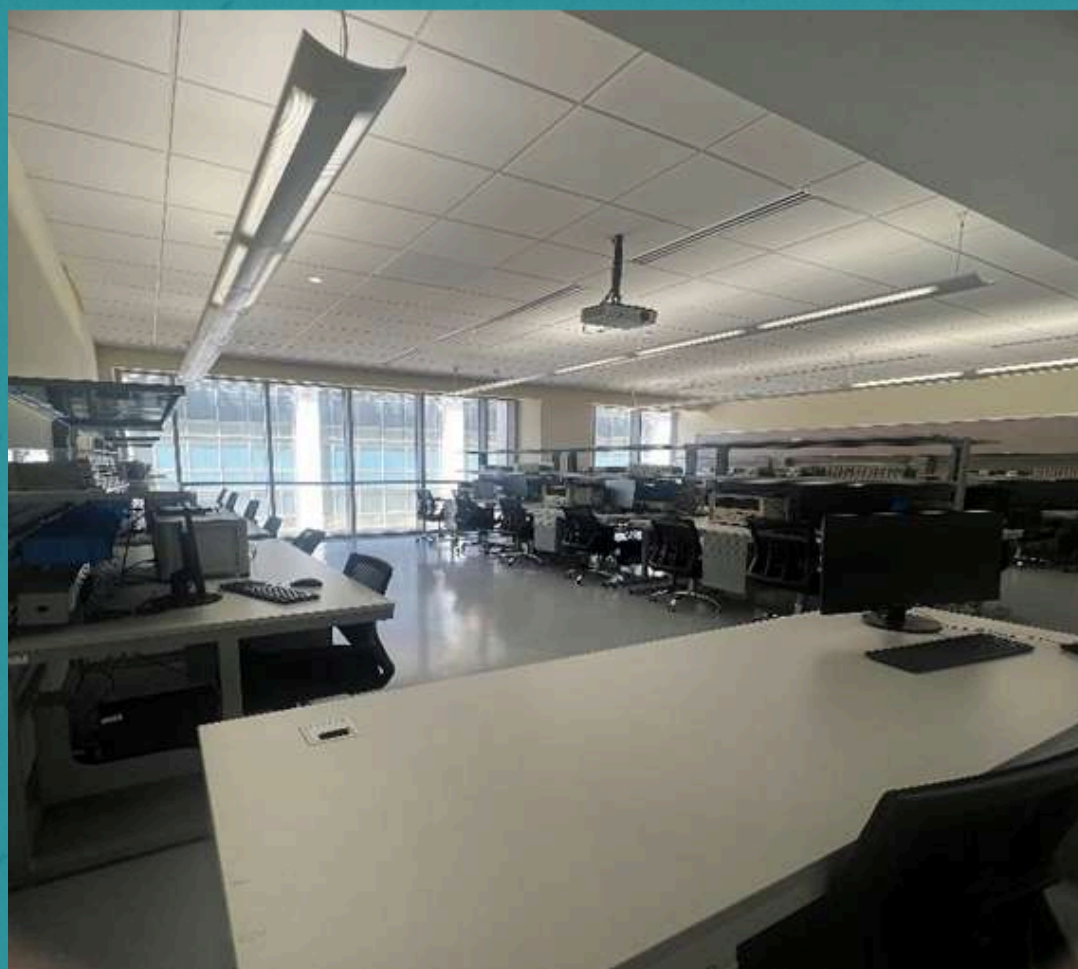
LABORATORIES

ENTRANCE

ELECTRICAL ENGINEERING DEPARTMENT
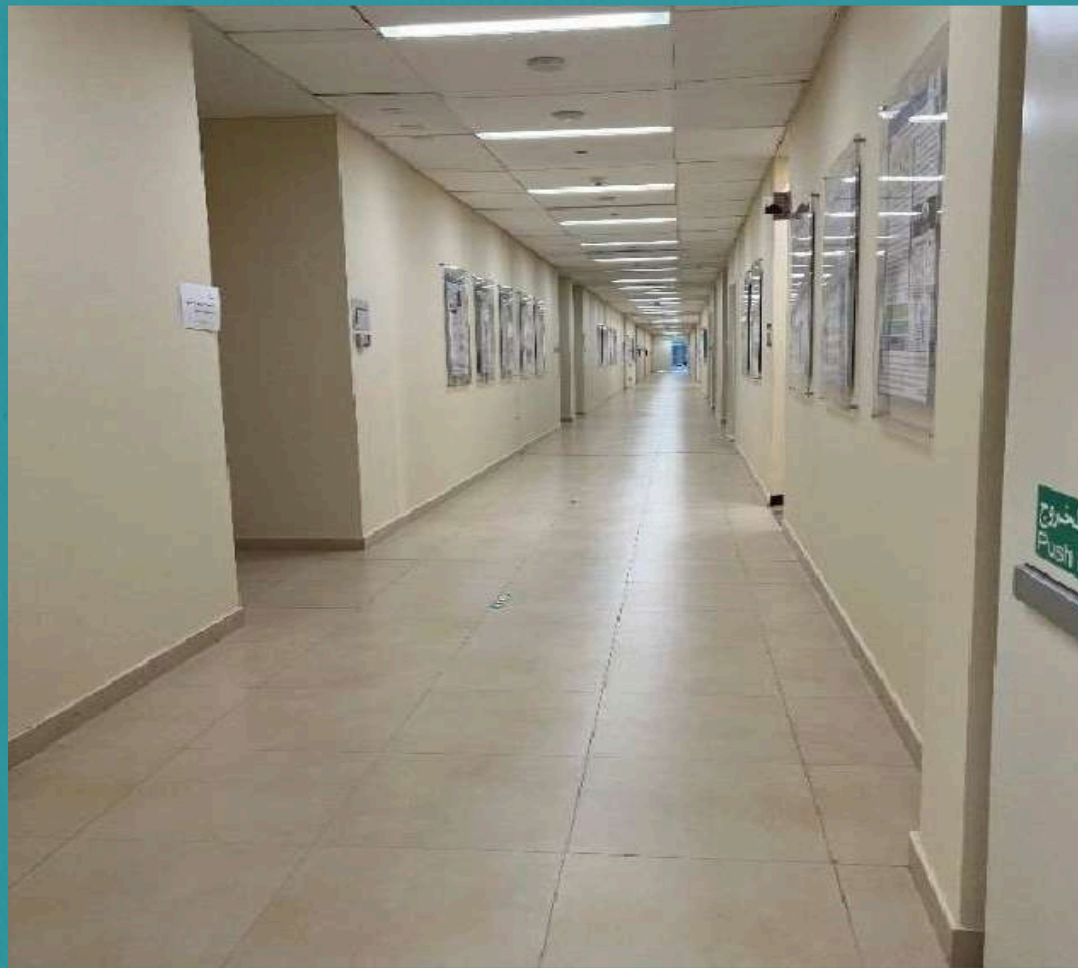
Laboratory overview

Electrical Engineering is a major that deals with the study and applications of electricity, electronics, and electromagnetic field transformers, Wind power stations, and Electronic circuits. This field became known in the late nineteenth century after the spread of the telegraph and power supply stations. The Electrical Engineering Department contains a number of educational laboratories equipped with high security and safety systems, which serve students and researchers and help them link theoretical material to practical applications on various laboratory workstations equipped with modern devices and tools that cover all branches of electrical engineering departments: The department contains (15) laboratories, which are as follows:

- Communication Systems Lab
- Advanced Communications Lab
- Communication Networks Lab
- Industrial Electronics Lab
- Solar Cell Lab
- Nano Technology Lab
- Antennas design Lab
- Electromagnetic Waves Lab
- Electrical Circuits and Measurements Lab
- Electronics Lab
- Digital Logic Circut Design Lab
- Computer System Architecture Lab
- Advanced Technology Lab
- Optical Electronics Lab
- Optical Communication Lab

LABORATORY GUIDE

Communications Systems Laboratory & Communications Networks Laboratory 1.601A

COMMUNICATIONS SYSTEMS LABORATORY & COMMUNICATIONS NETWORKS LABORATORY (1.601A)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Communications Systems course, and the Communications Networks course

VISION

Provide a hands-on experience about digital and wireless communication systems, networks and advanced communication courses to the students so that they are able to put theoretical concepts to practice with different communication systems devices

MISSION

Raise students' knowledge and skills for studying basic communication systems, and networks advanced communication courses by conduct various communication systems experiments.

COMMUNICATION SYSTEMS LAB

The main objective of this lab is to understand basic theories of analog communication system to design and implement analog modulator and demodulator and to investigate signals in time and frequency domain. Students conduct experiments to understand the signals available at different stages of AM and FM receivers. The objective of this lab is to familiarize the students with different blocks in digital communication

EXPERIMENTS LIST
• Basic Signals of Communication Systems and Signal Graphing using MATLAB
• Signal Operations using MATLAB
• Signal Correlation using MATLAB
• Fourier Series using MATLAB
• Fourier Transform using MATLAB
• Simulation of Communication Systems using MATLAB
• Amplitude Modulation using Emona Tims and MATLAB
• Amplitude Demodulation using Emona Tims and MATLAB
• Frequency Frequency Demodulation using Emona Tims and MATLAB
• Phase Modulation using Emona Tims and MATLAB
• Sampling Signals using Emona Tims
• Pulse Amplitude Modulation using Emona Tims
• Pulse Width Modulation using Emona Tims
• Pulse Position Modulation using Emona Tims

COMMUNICATION NETWORKS LAB

Review of basic digital communications and probability theory. Network Architectures. OSI Model and TCP/IP model. Physical layer protocols and digital transmission fundamentals. Data link layer protocols. Network layer protocols. Medium access control protocols. Packet switching and circuit switching. Routing techniques in packet switching networks. Security protocols. Emerging high-speed networks.

EXPERIMENTS LIST
• Familiarization with communication networks lab. • Design and configuration of simple LAN network lab. • Physical Layer Protocols lab • Transmission media characteristics lab. • Data link Layer Protocols lab1. • Basics of Switch basic Configuration lab. • Network Layer Protocols & IP Addressing lab. • Subnet Addressing and configuration lab. • Basics of Router configuration lab. • Design of simple and complex LANs lab. • Media Access Control techniques lab.

ADVANCED COMMUNICATIONS LAB

Ttheis s tudlaebn ts'eixs permienacinel yw ithi ndtiegnitdael da nd wtoi relesstsr ecnogmthmeunn ication systems. It provides practical hands-on experience with communication system building blocks and enables students to study the effects of noise and fading on the various digital communication schemes and wireless standards. The course instructor may design/select the proper set of experiments that satisfy the course objectives and outcomes.

EXPERIMENTS LIST

• Introduction to LabVIEW

• Introduction to software defined-radio hardware from National Instruments USRP (Universal Software Radio Peripheral).

• Simulation of Digital Comm. Schemes Using MATLAB-I- PSK and QAMmodulation over AWGN and Rayleigh fading channels.

• Simulation of Advanced Digital Comm. Schemes Using MATLAB-II- CDMAover AWGN and Rayleigh fading channels.

• Simulation of Advanced Digital Comm. Schemes Using MATLAB-III- OFDMover AWGN and Rayleigh fading channels.

• Matched filter detection using EMONA TIMS.

• Link Budget Analysis (propagation models and path loss calculations, shadowing models)

• GSM GPRS EDGE networks (coverage predictions, throughput calculations, Traffic analysis and Network dimensioning) Advanced Communications Lab

• LTE calculations, Trafficanalysis and Network dimensioning)

• The implementation of Block coding & decoding usingEMONA TIMS. (optional)

COMMUNICATIONS SYSTEMS LABORATORY & COMMUNICATIONS NETWORKS LABORATORY (1.601A)

Photo	Equipment
	WAVE FORM FUNCTION GENERATOR
	TELECOMMUNICATIONS INSTRUCTIONAL MODELLING SYSTEM
	WIRELESS ACCESS POINT
	ROUTER

LABORATORY GUIDE

Industrial electronics laboratory, solar cell laboratory, &
nanotechnology laboratory
1.601B

INDUSTRIAL ELECTRONICS LABORATORY, SOLAR CELL LABORATORY, & NANOTECHNOLOGY LABORATORY
(1.601B)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the industrial electronics course, the solar cells course, and the nanotechnology course

VISION

To provide a hands-on experience about Industrial Electronics, Solar Cell and Nanotechnology Laboratory courses to the students so that they can put theoretical conscepts to practice and enhance research, and development in the field with an interest in the manufacture, measurement and testing.

MISSION

- To impart research skills in nanotechnology Design
- and testing of industrial electronics systems. Spreading knowledge
- through teaching and best practices. Study of solar cells and, their
- technological ascent.

INDUSTRIAL ELECTRONICS LAB

Introduction to measurement systems and basic definitions. Sensing and transduction of non-electrical quaities, Sensors (temperature, humidity, light, piezoelectric, Hall Effect, pressure, flow and strain gauges) and, signal conditioning circuits (bridge, instrumentation amplifier, scaling circuits, comparators, A/D and D/A, 555 timer). Instrumentation amplifier. LCD and 7 segment interface. Ultrasonic transistors and applications. Voltage regulators (series, shunt, 3 terminals, switched mode).

EXPERIMENTS LIST

- Study of Thysistors; SCR, Diac, Traic
- 555 Timer in Industrial Applications
- Uncontrolled Bridge Rectifier
- Characteristics of a Thyristor
- Characteristics of Silicon Controlled Rectifier
- Half Wave Rectifier using Triggering
- Full Wave Rectifier using Triggering
- A Simple Series Voltage Regulator
- A Voltage Regulator Using Op-Amp
- UJT as a relaxation oscillator

SOLAR CELL LAB

Learn about the principles of the photovoltaic conversion. Explain the advantages and limitations of different solar cell technologies. Present an understanding of the specifications of solar modules and know how to design a complete solar system for a particular application.

EXPERIMENTS LIST
- Solar cell fabrication-demonstration (first generation).
- Solar cell fabrication-demonstration (second generation).
- Solar cell fabrication-demonstration (third generation)
- Solar Cell Characteristics: V-I Characteristics and fill factor.
- Series and Parallel PV Cell Connections.
- The Optimum Incident Anglefor a Solar Cell.
- Efficiency of a solar cell. • Light intensity and light filters.
- Investigation of Loads on PV Cells.
- Output Current and Light Spectrum (Wavelength).
- Power Output and Tempreature.

NANO TECHNOLOGY LAB

The main equipment used in this lab is Scanning Tunneling Microscope. A scanning tunneling microscope (STM) is a type of microscope used for imaging surfaces at the atomic level. The main components of a scanning tunneling microscope are the scanning tip, and coarse sample-to-tip approach mechanism. The microscope is controlled by dedicated electronics and a computer.

EXPERIMENTS LIST
• Scanning tunnelling microscope-basic principle.
• Functions of scanning tunnelling microscope.
• Atomic structure- highly oriented pyrolytic graphite (HOPG)
• Atomic structure titanium, tantalum and molybdenum disulfides (TiS2, TaS2, MoS2). • Electron density.
• Particle in a box.
• Electron tunnelling.
• Molecular orbitals.
• Molecular Self-assembled monolayers (SAMs) on a gold surface.
• Self-assembled systems- monolayers of C60 molecules.
• Self-assembled systems- carbon nanotubes.

INDUSTRIAL ELECTRONICS LABORATORY, SOLAR CELL LABORATORY, & NANOTECHNOLOGY LABORATORY EQUIPMENT (1.601B)

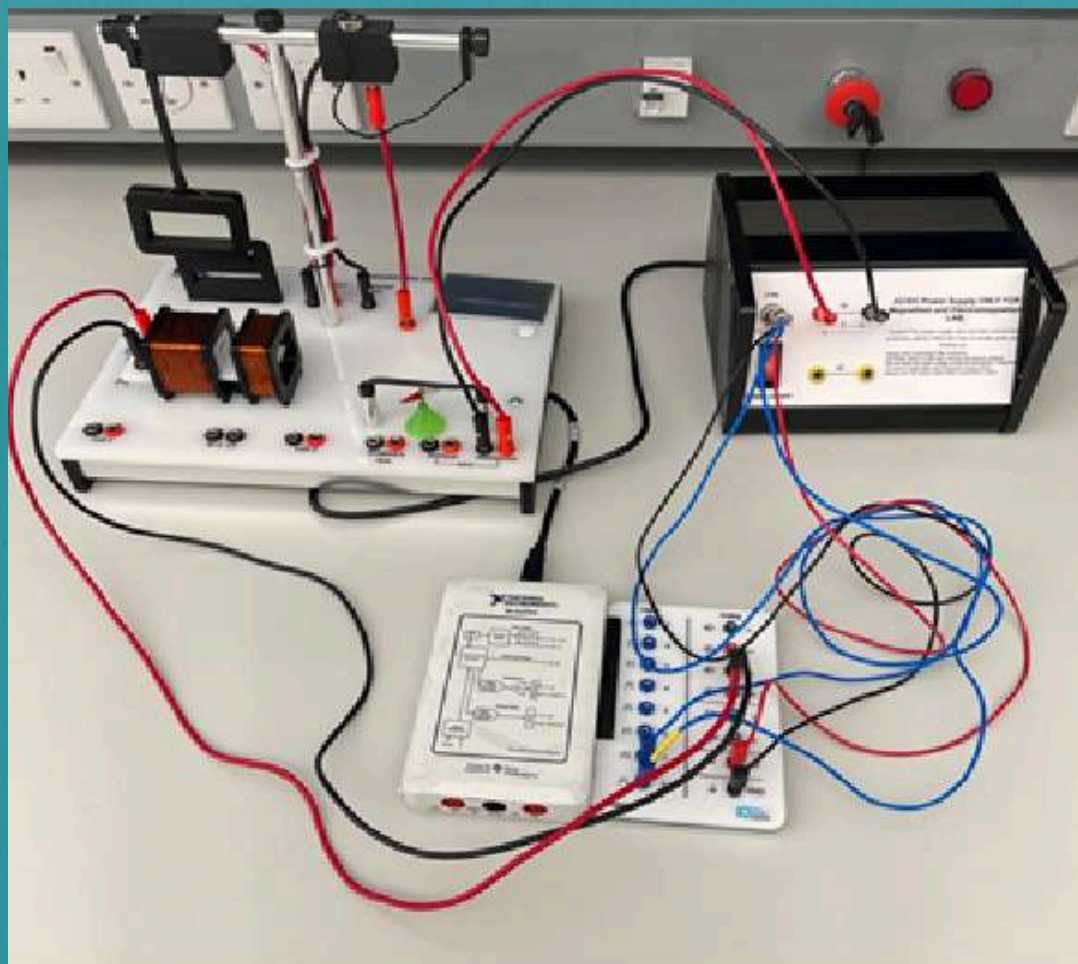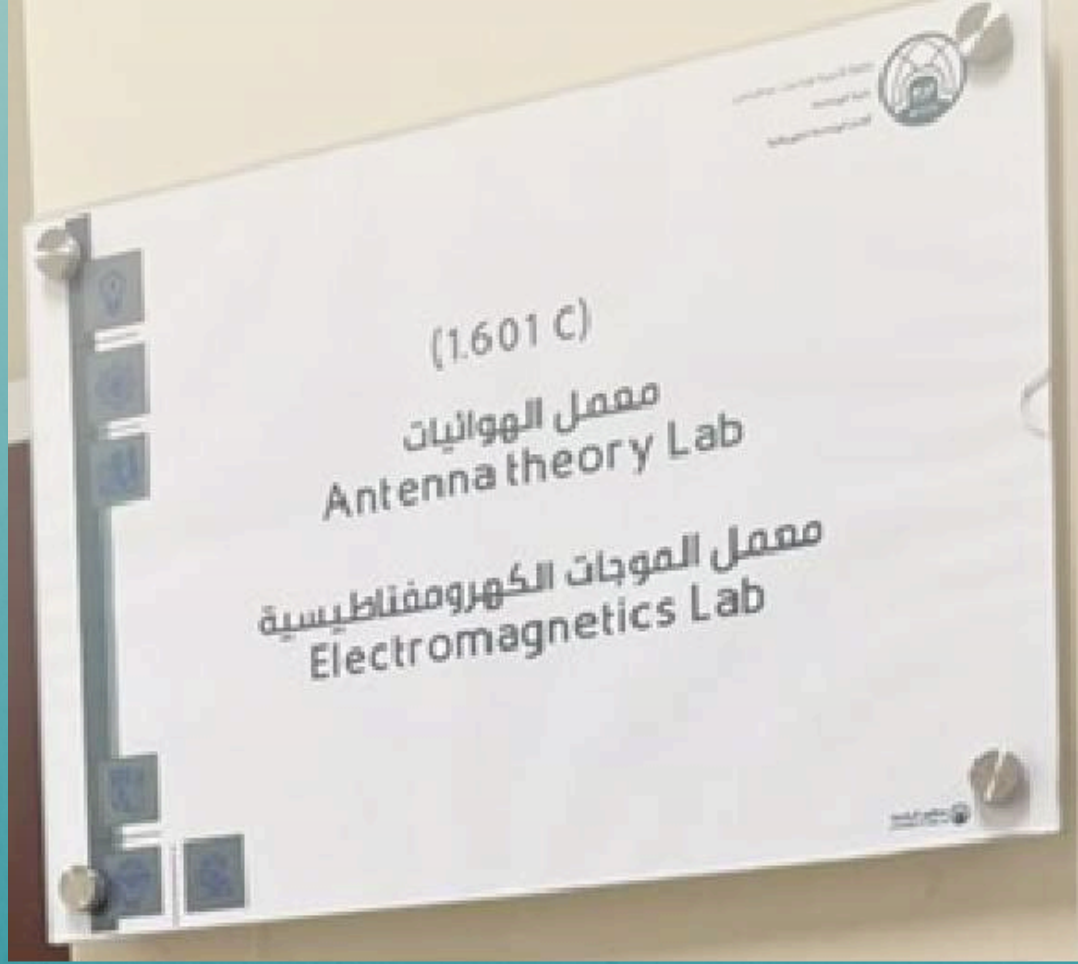| Photo	Equipment
	SCANNING TUNNELING MICROSCOPE
	INDUSTRIAL ELECTRONICS TRAINER KIT
	SOLAR ENERGY TRAINING SYSTEM

LABORATORY GUIDE

Antennas Laboratory and Electromagnetic Waves Laboratory
1.601C

ANTENNAS LABORATORY AND ELECTROMAGNETIC WAVES LABORATORY (1.601C)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Antennas course and Electromagnetic Waves course.

VISION

The vision of Antenna and Electromagnetic Laboratory is to conduct teaching the Antennas course and Electromagnetic Waves course.

MISSION

- Building and developing the capabilities of students in the fields of electromagnetism and antennas.
- Design, production and testing of antennas.
- Spreading knowledge through teachind and best practices.
- Study thepropagation of radar waves and microwave imaging.
- Development and manufacture of integrated microwave circuits.

ANTENNAS LAB

This lab contributes to enabling students to conduct various experiments to enhance the knowledge and skills they acquired from studying the basic principles of electrostatic, magnetic and electromagnetic fields and the basics of numerical analysis of antennas and their types. The lab consists of simulation experiments using MATLAB software and experiments based on the use of specialized training equipment.

EXPERIMENTS LIST
• Getting Familiar with the Laboratory Equipment & lab safety guidelines.
• Getting Started with HFSS software-A Waveguide T-Junction.
• Radiation Pattern of a λ/2 Dipole antenna at 1 GHz.
• MATLAB Exercise #1 and Problem Session.
• Design of Dipole antenna using HFSS.
• Radiation Pattern of an Open Waveguide at 10 GHz.
• Radiation Characteristics of Finite Length dipoles.
• MATLAB Exercise # 2 and Problem Session.
• Gain Measurements of Pyramidal Horn Antennas.
• Circular Polarization and Helical Antennas.
• Parabolic Antenna.

ELECTROMAGNETIC WAVES LAB

This lab contributes to enabling students to conduct various experiments to enhance the knowledge and skills they acquired from studying the basic principles of electrostatic, magnetic and electromagnetic fields and the basics of numerical analysis of antennas and their types. The lab consists of simulation experiments using MATLAB software and experiments based on the use of specialized training equipment.

EXPERIMENTS LIST
- Introduction to MATLAB for Electromagnetics.
- Vectors and Coordinate Systems.
- Vector Calculus and Phasors.
- Electrostatic Fields.
- Gauss's Law and Electric Potential.
- Dielectrics and Capacitance.
- Magnetostatic Fields.
- Oersted's Experiment.
- Ampere's Law.
- Magnetic Forces and Materials.
- Electromagnetic Inductance.
- Boundary Value Problems.

ANTENNAS LABORATORY AND ELECTROMAGNETIC WAVES LABORATORY EQUIPMENT (1.601C)

Photo	Equipment
	GUIDED ELECTROMAGNETIC WAVES TRAINING SYSTEM
	NETWORK ANALYZER
	ANTENNA TRAINING SYSTEM WITH A POWER METER

LABORATORY GUIDE

Electrical Circuits and Measurements Laboratory
1.602A

ELECTRICAL CIRCUITS AND MEASUREMENTS LABORATORY (1.602A)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Electric Circuits 1 (ECE 210) course, and Electric Circuits 2 (ECE 211) course.

VISION
Provide abao uth athned sb-aosnic perxinpceiprilensc oef electric circuits to the students so
that they are able to put theoretical concepts to practice by connect and
test electrical circuits.

MISSION
Raise students' knowledge and skills for studying the basic principles of DC &AC electric circuits through design, simulation and hardware implementation.

The main objective of this lab is to conduct various experiments to consolidate knowledge and skills for studying basic principles of DC&AC electric circuits as well as giving them the insight on design, simulation and hardware implementation of circuits. The main aim is to provide hands-on experience to the students so that they are able to put the or theoretical concepts to practice. The laboratory is equipped with several different devices for designing electrical circuits, including DC source device, electrical signal generator device, signal display device, multiple meters (for measuring voltage, electric current, resistors, and power), and tools. To connect and test electrical circuits Each experiment consists of two parts, 'simulation' and 'hardwired'. Computer simulation is stressed upon as it is a key analysis tool of engineering design. "Multisim Electronics Workbench" software is used for simulation of electric circuits.

ELECTRIC CIRCUITS 1 (ECE 210)/ EXPERIMENTS LIST

• Basic Lab Equipment and Measurements.

• Resistor's and Ohm's law.

• Series and Parallel DC circuit.

• Kirchhoff's Laws. • Current and Voltage Divider Rules.

• Thevenin's theorem & Norton's theorem.

• Maximum power transfer.

• First order R-L and R-C circuit & RLC.

• Mesh analysis.

• Nodal analysis.

• Super position.

ELECTRIC CIRCUITS 2 (ECE 211)/ EXPERIMENTS LIST

• Voltage & Current measurements in AC Circuits.

• Ohm's Law in AC Circuits.

• Phasor Relationships for Passive Circuit Elements (RC, RL and RLC circuits in alternating current).

• Nodal Analysis for AC Circuits.

• Mesh Analysis for AC Circuits.

• Resonance in AC Circuits.

• Power in AC Circuits.

• Voltage & Current measurements in AC Circuits.

• Ohm's Law in AC Circuits.

ELECTRICAL CIRCUITS AND MEASUREMENTS LABORATORY EQUIPMENT (1.602A)

Photo	Equipment
	PRECISE INDUCTOR BOX
	PRECISE CAPACITOR BOX
	PRECISION OHM SOURCE

ELECTRICAL CIRCUITS AND MEASUREMENTS LABORATORY EQUIPMENT (1.602A)

Photo	Equipment
	MULTI-CHANNEL FUNCTION GENERATOR
	PROGRAMMABLE DC POWER SUPPLY
	OSCILLOSCOPES
	6 1/2 DIGIT DUAL MEASUREMENT MUSTIMETER

GUIDE

LABORATORY

Electronics Laboratory
1.602B

ELECTRONICS LABORATORY
(1.602B)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Electronics 1 (ECE 241) course, and Electronics 1 (ECE 241) course.

VISION

Ofer a high-quality practical to learning experience and to nurture the skill in design, implementation, verifying, and troubleshooting of electronic circuits.

MISSION

To impart the practical skills, for empowering the state-of the-art technology in the design of electronic products. To design and develop simple and innovative electronic products by staying in tune with the technologies advancements.

The main objective of this lab is to let the students perform different experiments to consolidate the knowledge they acquired in Electronics I and Electronics II courses. This lab has been arranged to prepare the students with the necessary practical awareness of electronics principles. The students get familiarized with the various electronics instruments & components which motivates them to construct complex electronic circuits by themselves. In this lab students prototype basic electronic circuits in bread board and verify the results with the theoretical concepts. Lab experiments are designed in such a way that the engineering skill of the students starts to cultivate.

ELECTRONICS 1 (ECE 241)/ EXPERIMENTS LIST
• Diode Characteristics.
• Half-wave rectifier.
• Common Emitter Amplifier.
• Basic Op-amp circuits.
• Clipper circuit.
• Clamper circuit.
• Full- wave rectifier.
• Transistor as switch.

ELECTRONICS 1 (ECE 241)/ EXPERIMENTS LIST
• Differential Amplifiers.
• Multistage Amplifiers.
• Frequency Response.
• Integrator and Differentiator Circuit.
• Active Low pass Filter.
• RC Shift Oscillator.
• Wien Bridge Oscillator.
• Astable multivibrator.
• Active Band pass Filter.
• Schmitt Trigger Circuit.
• Monostable multivibrator.
• Active High pass Filter.
• Active Band stop or Notch Filter.

ELECTRONICS LABORATORY EQUIPMENT
1.602B

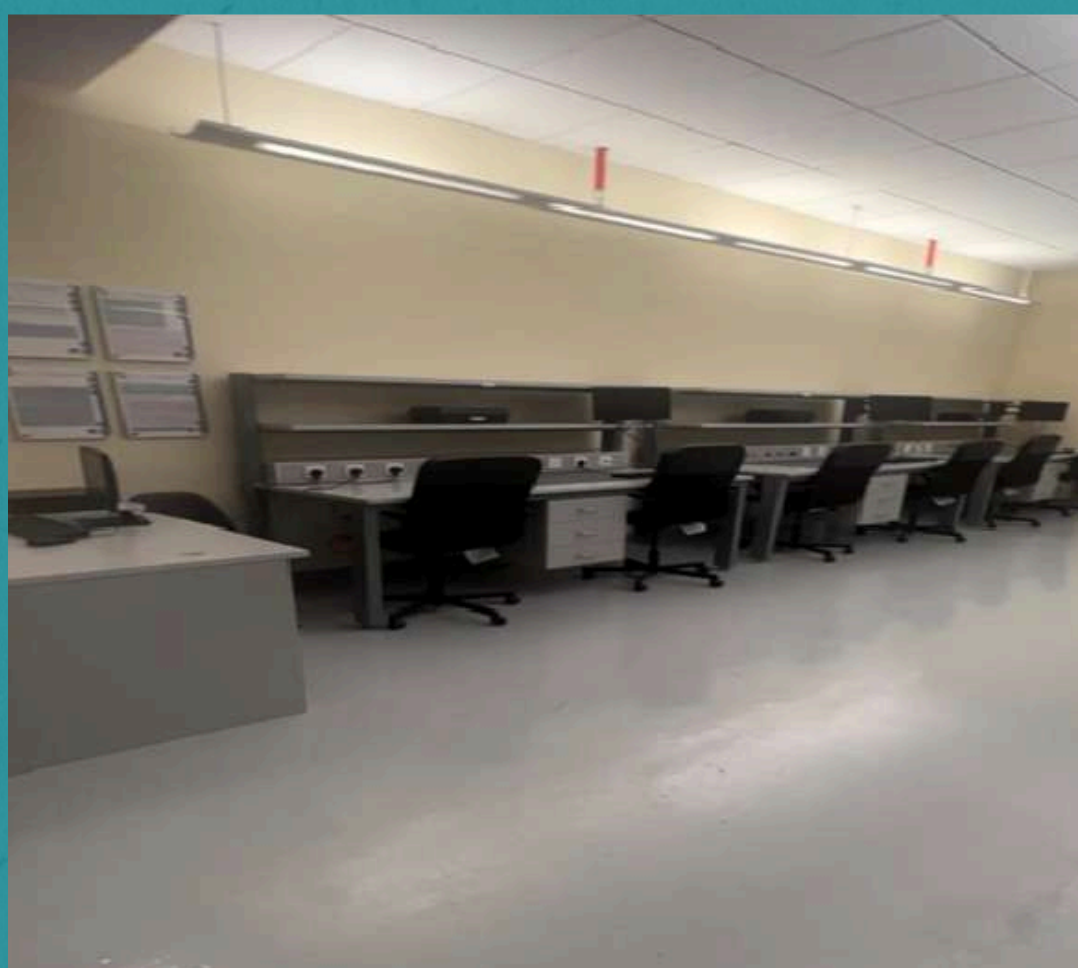| Photo	Equipment
	MULTI-CHANNEL FUNCTION GENERATOR
	PROGRAMMABLE DC POWER SUPPLY
	OSCILLOSCOPES
	6 1/2 DIGIT DUAL MEASUREMENT MUSTIMETER

LABORATORY GUIDE

Digital Design and Computer Architecture Laboratory
1.602C

DIGITAL DESIGN AND COMPUTER ARCHITECTURE LABORATORY (1.602C)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching Digital Logic Circuit Design course, and Computer Architecture course.

VISION

Provide a unique experience that will contribute to a better understanding of the principles of digital logic.

MISSION

Performing the experiments that will enable the students to understand the mechanism of digital logic gates and link the theoretical principles with the actual reality by using the latest technologies and tools.

The main objective of this lab is to conduct various experiments to consolidate knowledge and skills to study the basics of digital circuit and computer system engineering courses. The lab is equipped with many different devices for designing logic circuits including NI ELVISIII, digital electronics board, computers, and asset of tools. These devices provide an interactive learning experience and a greater understanding of the fundamentals of engineering and digital systems design. Digital logic design is a fundamental course for electrical engineering and computer architecture. It has a variety of applications that serve many modern technology systems. Therefore, we provide the students with a rich practical experience.

DIGITAL LOGIC CIRCUIT DESIGN / EXPERIMENTS LIST

• Logic Functions Simplification and Implementation.
• Operation of Logic Gates.
• Gate-Level Minimizationr.
• Half Adder and Full Adder Circuits.
• Decoder and Encoder Circuits.
• Multiplexer and Demultiplexer.
• Flip-Flop Fundamentalsr.
• Registers and Counters.
• PC Hardware and Operating System.
• Random Access Memory.
• Sequential Logic Circuits.

COMPUTER ARCHITECTURE / EXPERIMENTS LIST

• Introduction to Debug and Turbo Debugger.
• Addressing modes and data transfer instructions.
• Arithmetic instructions.
• Shift and rotate instructions.
• Using BIOS Services and DOS functions Part 1: Text-based Graphics.
• Using BIOS Services and DOS functions Part 2: Pixel-based Graphics.
• Introduction to Flight86 Microprocessor Trainer and Application.
• Flight86 Application I –Traffic Lights.
• Flight86 Application II –Motor Control.
• Introduction to the 8051 Microcontroller.

DIGITAL DESIGN AND COMPUTER ARCHITECTURE LABORATORY EQUIPMENT (1.602C)
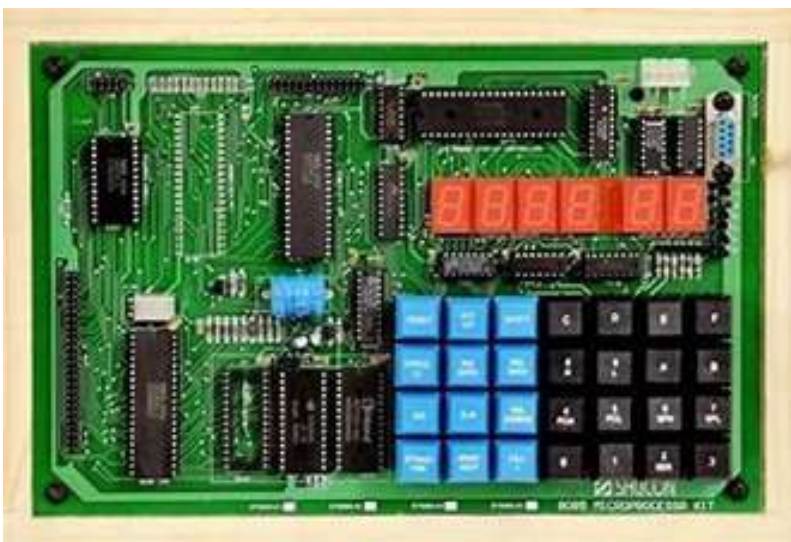
Photo	Equipment
	ENGINEERING VIRTUAL LABORATORY PLATFORM -NI ELVIS-III
	OSCILLOSCOPES
	8085 MICROPROCESSOR KIT
	8051 MICROCONTROLLER KIT

DIGITAL DESIGN AND COMPUTER ARCHITECTURE LABORATORY EQUIPMENT (1.602C)

Photo	Equipment
	ELECTRONIC MINI LAB A/D TRAINER BOARD
	DIGITAL ELECTRONICS BOARD
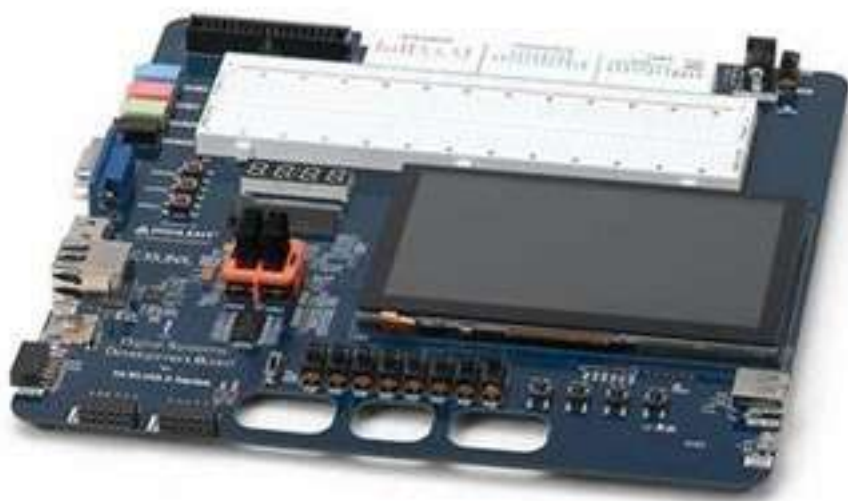
LABORATORY GUIDE

Advanced Technology Laboratory
1.604A

ADVANCED TECHNOLOGY LABORATORY
(1.604A)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Advanced Technology course.

VISION

Providing practical experience for students in the field of digital and systems and the maintenance of various electronic systems, so that they can implement and apply theoretical concepts in practice through various communication devices and electronic devices.

MISSION

Enable students to perform experiments related to the basics of communications, digital and wireless communications, and electronic systems, and analyze the results, which help them to link between theoritical principles and actual reality, using the latest technologies and tools.

The advanced technology lab aims to develop the practical skills of the students of the Communications Technician Diploma and the Electronics Technician Diploma, through the practical application of the theoretical concepts of the specialization courses. The lab is equipped with all the necessary equipment and devices to conduct experiments so that the student acquires sufficient applied skills to achieve learning outcomes in the field of skills and values.

ADVANCED TECHNOLOGY / EXPERIMENTS LIST

• Electrical Circuits and Measurements.

•Electrical circuits applications and measurements devices.

• Digital Logic Circuits Applications.

• Advanced Digital Circuits.

• Analog communication workshop.

•Workshop of digital communications.

• Digital Switching Applications.

• Antenna theory and wave propagation.

• Mobile communication Techniques.

•Microprocessor & Microelectronics Applications.

• Electronic Lab1.

• Electronic Lab2.

• Industrial Electronic Applications.

• Industrial Electronic Applications.

• Electronic Systems Troubleshooting.

• Optoelectronics Applications.

ADVANCED TECHNOLOGY LABORATORY EQUIPMENT (1.604A)

Photo	Equipment
	POWER SUPPLY REGULATION CIRCUIT
	MANUAL BASE UNIT
	DIGITAL MULTIMETER WITH FUNCTION GENERATOR
	OSCILLOSCOPES

ADVANCED TECHNOLOGY LABORATORY EQUIPMENT (1.604A)

Photo	Equipment
	ELECTRONIC MINI LAB A/D TRAINER BOARD
	DIGITAL ELECTRONICS BOARD
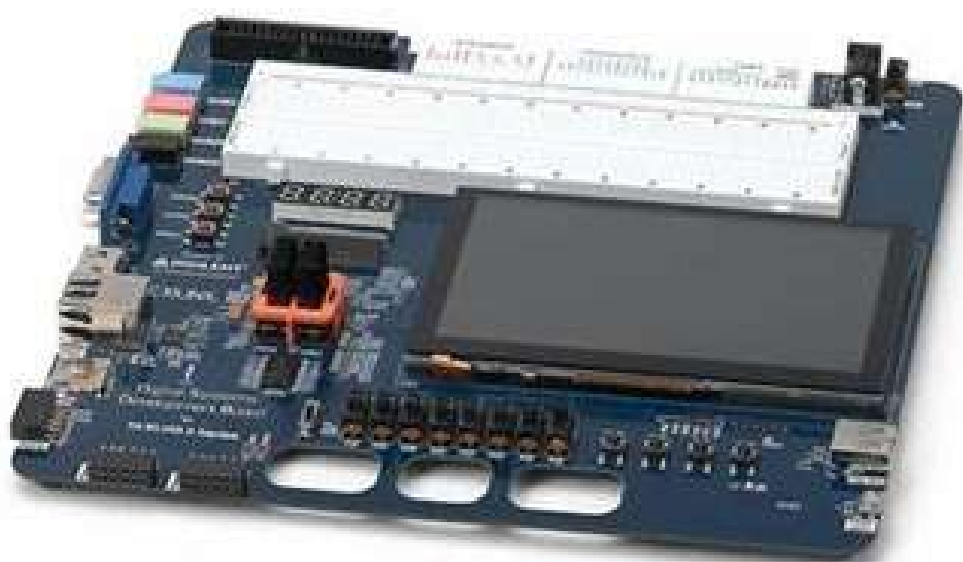
LABORATORY

GUIDE

Optical Electronics Laboratory
1.604B

OPTICAL ELECTRONICS LABORATORY
(1.604B)

The laboratory is located on the first floor of the College of Engineering and specializes in teaching the Electric Circuits 1 (ECE 210) course, and Electric Circuits 2 (ECE 211) course.

VISION
Provide a unique experience that will contribute to a give more understand of the principles of optoelectronics.

MISSION
Performing the experiments that wtoi lul ndeenrasbtalen d the opstouedlenctsro nics
and link the theoretical principles with the actual reality by using the latest technologies and tools.

The Optical Electronics and communication laboratory focuses on pinr oovipdtionegl ecutrnodneicrsg radnuda tceosm mwuitnhi cahtiaond sw hoicnh ies xpaenr ieimncpeo rtant multidisciplinary technology. Optoelectronics involves using electrons (electricity) and photons (light or optical energy) to perform useful functions. Optoelectronics is an area of importance in engineering and in the consumer market. A multidisciplinary endeavor combining elements of physics, electrical engineering, materials science and optoelectronics is a good forum to introduce students to bring together information from many different technical fields. Although many people observe optoelectronics in action in remote controls or compact disk (CD) players, most undergraduates do not get much exposure to optoelectronics in engineering curricula. This is particularly true at the freshman level. However, it is possible to introduce students to this area with a modest amount of expenditure.

OPTICAL ELECTRONICS (ECE 350)/ EXPERIMENTS LIST

• Optical Power Measurement.
•The HeNe Laser Intensity Profile: Theory and Experimental Verification.
• Light Polarization and Focal Length of Thin Lenses.
• Determination of the Acceptance Angle and the Numerical Aperture of Optical Fibers.

OPTICAL COMMUNICATION (ECE 476)/ EXPERIMENTS LIST

• Fiber Misalignment Loss Measurement.
• Fiber Splicing and Introduction to the OTDR.
• OTDR Measurement of Fiber Length, Attenuation, and Splice Loss.
• Characteristics of the Light Emitting Diode.
• Characteristics of the Photodiode.

ADVANCED TECHNOLOGY LABORATORY EQUIPMENT (1.604A)

Photo	Equipment
	OPTICAL POWER METER
	PROGRAMMABLE DC POWER SUPPLY
	FIBER OPTIC CLEAVE
	OTDR OPTICAL TIME DOMAIN REFLECTOMETER

ADVANCED TECHNOLOGY LABORATORY EQUIPMENT 1.604A

Photo	Equipment
	FIBER OPTIC COMMUNICATION TRAINING KIT
	MULTI-CHANNEL FUNCTION GENERATOR
	6 1/2 DIGIT DUAL MEASUREMENT MULTIMETER

ADVANCED TECHNOLOGY LABORATORY EQUIPMENT (1.604A)

Photo	Equipment
	POWER ANALYZER
	CURVE TRACER (ANALYZER TRAINER)
	FREQUENCY COUNTER

SAFETY IN THE LABORATORY

- Carefully read the safety instructions before starting to work with the laboratory setup.
- Follow the safety arrangements when connecting the hardware and during the hands-on operations.

FOR YOUR SAFETY YOU MUST FOLLOW SAFETY RULES PARTICULARLY

- No Food or Drink is permitted in the lab.
- Playing computer games is not allowed.
- The lab is for academic, research and training purposes only.
- The Test Bench can only be used indoors, in the absence of electrical shock risk factors, such as extreme humidity, lack of grounding, etc.
- Prevent the entry of water into the device.
- Before you leave the computer lab, please Close all instruments and switch off the bench.
- Leave your area clean and tidy for the next student.
- The test bench can only be powered up with the permission and in the presence of instructor.

SAMPLES

SAMPLES

KINGDOM OF SAUDI ARABIA
Ministry of Education
Princess Nourah bint Abdurrahman university
(048)

College of Engineering
Electrical Engineering Department

Laboratory Equipment/Devices Maintenance Request (Term ____ Year ____)

نموذج متابعة صيانة أجهزة المعامل (الفصل الدراسي ____ العام الدراسي ____)

ملاحظات على حالة الجهاز Comments on the Device	رقم المبنى Building No.	رقم المعمل Lab. No.	تاريخ تنفيذ الصيانة Maintenance Completion Date	رقم طلب الصيانة Maintenance Request No.	تاريخ طلب الصيانة Maintenance Request Date	المسؤول عن طلب الصيانة Responsible for Maintenance Request	الرقم التسلسلي The serial number	اسم الجهاز The device name

رئيس لجنة المعامل بقسم الهندسة الكهربية
Head of the Electrical Engineering Laboratories Committee

فنية المختبر المسؤولة
Responsible Laboratory Technician

LABORATORY EQUIPMENT/DEVICES MAINTENANCE
REQUEST

SAMPLES

KINGDOM OF SAUDI ARABIA
Ministry of Education
Princess Nourah bint Abdurrahman university
(048)

College of Engineering
Electrical Engineering Department

المملكة العربية السعودية
وزارة التعليم
جامعة الأميرة نورة بنت عبدالرحمن
(048)

كلية الهندسة
قسم الهندسة الكهربائية لجنة المعامل والمختبرات

العام الدراسي /
نموذج متابعة أجهزة مستودع ((الفصل الدراسي
Store Equipment Follow-up Form (Term   Year   )

ملاحظات notes	تاريخ الإرجاع Return date	رقم المبنى Building No.	رقم المنقول إليه Transferred (in) Lab No.	رقم المنقول منه Transferred (out) Lab No.	تاريخ انجاز المهمة Date of completion of the task	المسؤول عن تنفيذ المهمة Responsible for achieving the task	المسؤول عن طلب المهمة Responsible for requesting the task	عدد الأجهزة Number of devices	المهمة (اعارة أو نقل) tasks (Lending or Transferring)

رئيسة لجنة المعامل بقسم الهندسة الكهربية
Head of the Electrical Engineering
Laboratories Committee

فنية المختبر المسؤولة
Responsible Laboratory Technician

نموذج

STORE EQUIPMENT FOLLOW-UP FORM

SAMPLES

نموذج حصر أدوات الأمن والسلامة في المعامل (الفصل الدراسي   , Year)

Inventory of Safety and Security Tools in Labs Form (Term   )

الفصل الدراسي / العام الدراسي

المعمل LABORATORY / أدوات الأمن والسلامة SAFETY TOOLS	الإسعافات الأولية FIRST AID		نظام إطفاء الحريق FIRE EXTINGUISHING SYSTEM	طفايات الحريق FIRE EXTINGUISHER	بطانيات إطفاء حريق FIRE BLANKETS	سطل الرمل لإطفاء الحريق BUCKET OF SAND TO PUT OUT A FIRE
	الصيدلية الميدانية First Aid Box	أدوات الصيدلية الميدانية first Aid Tools				
1.601A						
1.601B						
1.601C						
1.602A						
1.602B						
1.602C						
1.604A						
1.604B						

رئيسة لجنة المعامل بقسم الهندسة الكهربائية
Head of the Electrical Engineering Laboratories Committee

فنية المختبر المسؤولة
Responsible Laboratories Technician

٤/٥

INVENTORY OF SAFETY AND SECURITY TOOLS IN LABS FORM

SAMPLES

نموذج فحص صلاحية عمل أجهزة لأغراض نقّل عهده

(الترم   -   )

Laboratory Equipment Examination Form for Asset Transfer
(Term   -Year   )

القسم المسلم للعهدة القسم المستلم للعهدة	المعمل المنقول له العهدة	قسم الهندسة الكهربية Electrical Engineering Department	القسم المسلم للعهدة
قسم الهندسة .... Engineering Department	To Lab No. ( )		From Lab No. ( )
	المشرفة على فحص الأجهزة من قسم الهندسة .... Supervisor of .... Engineering Department		المشرفة على فحص الأجهزة من قسم الهندسة الكهربية Supervisor of Electrical Engineering Department

ملاحظات comments	مدى صلاحية الجهاز Device validity		رقم المصنع التسلسلي الفريد Serial number	العدد The number	الجهاز The device	
	لا يعمل Invalid	يعمل valid				
						1
						2
						3

رنيسة قسم الهندسة الكهربائية
Head of the Electrical Engineering Laboratories Committee

رنيسة لجنة معامل قسم الهندسة الكهربائية
Head of the Electrical Engineering Laboratories Committee

منى /ع

Laboratory Equipment Examination FORM for Asset Transfer