



## Booklet

# Biomedical Technology - Instruments BMT-I

2017

**King Saud University**  
**College of Applied Medical Sciences**  
**Department of Biomedical Technology**

## **1. Introduction**

### **1.1. About the department**

The Biomedical Technology Department at College of Applied Medical Sciences is the first specialized academic department all over the Kingdom in the field of biomedical equipment. Over recent years, the health care systems have seen an increase use of advanced medical devices in the diagnosis and treatment of diseases. Currently, many of the disorders in body functions can be detected by direct or indirect use and application of such devices with complicated technology. Such situations require specialized skills of professionals who are highly qualified in the development, operation, and maintenance of these complex medical devices. The preparation of such competent professional requires providing them with knowledge in areas such as: biomedical sciences, mechanical and electrical skills, medical electronics, computer technology application in the medical engineering fields, knowledge of medical equipment and biological systems principles with the ability to apply these principles, knowledge of safety procedures with the ability to plan and implement safety program for medical devices, the ability on planning and technical analysis of medical devices, interaction with the medical team, the ability to analyze biological data and medical images, and dealing with medical information systems.

### **1.2. Description of the profession**

**Medical equipment specialist:** Specialized who can Design, develop, calibrate, test, selection, marketing, maintenance and/or repair of medical devices.

### **1.3. Career opportunities**

Graduates of this program will be working as a medical equipment specialist (as classified by the civil service). Graduates will work in the areas of technical medical equipment whether in public or private sectors such as hospitals, health authorities (e.g. Saudi Food and Drug Administration), industrial fields, academic institutions and medical equipment companies or agencies. In addition, graduates can work in research centers and authorities concerned with standards and specifications in government agencies. A graduate will be working in jobs such as:

- **In hospitals:** in the Devices planning, management and selection, installation, maintenance, testing, and specification writing of medical devices
- **In the industry:** in the field of Design, manufacturing and research & development of medical devices to suit the biological systems of the humans
- **In academic institutions:** in the field of technical training and academic lab teaching for some courses for students of program students or similar programs
- **In the medical equipment companies or agencies:** in the field of marketing, sales, maintenance and repair of medical devices
- **In research centers:** in the development and innovation of new products and materials suitable for biological human systems associated with the ongoing evolution of medical devices and the development of systems for collecting and analyzing biological data.

- **In government bodies for Standardization and Metrology:** in the field of testing and calibration of medical devices in hospitals and health centers (governmental and private) for the issuance of certificates of airworthiness for these devices as well as to develop standard specifications for equipment and biomaterials internationally accepted and which should determine the extent of their use in the Saudi Arabia.

## **2. Department Vision**

Pioneering and Excellence in preparing competent professional in the field of Biomedical Equipment Technology

## **3. Department Mission**

Preparing highly competent graduates in the field of Biomedical Equipment Technology to support the health care sector, to serve the community, and contribute towards the knowledge-based economy.

## **4. Department Goals**

Preparing highly competent graduates in the field of Biomedical Equipment

- Provide working environment that promote education and creativity.
- Ensure the quality of education
- Prepare qualified staff in the field of biomedical technology
- Promote distinctive research and dissemination of technology in the field of medical equipment.
- Attract a number of faculty members with expertise in the field of technical medical equipment.
- Offering master's program in technical medical devices
- Activating internal and external partnerships in the areas of educational, applied research, and consultation services.
- Contribute effectively to community service and development.

## **5. Department Features**

Biomedical Technology Department was established at the College of Applied Medical Sciences as the first academic department specializing in the Kingdom to achieve such goal.

## **6. Academic program**

Currently only one program is being offered which is Bachelor in “Biomedical Tech – Instruments”.

## **7. The program**

### **7.1. Program Description**

The program of medical devices covers general engineering principles and bioelectronics as well as their application to the development, maintenance and operation of various types of medical devices. Subjects are provided with appropriate laboratory and field training in health institutions in order to develop and increase the efficiency of graduates through the daily work in the field of health services.

### **7.2. Program mission**

Preparing highly competent graduates in the field of Biomedical Equipment Technology to support the health care sector, and to serve the community.

### **7.3 Program Objectives**

- To achieve successful careers in biomedical instrumentation technology
- To become successful technical advisors, managers, and techno-entrepreneurs
- To pursue life-long learning and become successful educators for healthcare community through higher education and continual professional development.

### **7.4 Program Outcomes**

Consistent with the College's Mission Statement, the Outcomes of Biomedical Equipment Technology Program are:

- an ability to select and apply the knowledge, techniques, skills, and modern tools of biomedical technology to include the application of circuit analysis, analog and digital electronics, microcomputers, biomechanics, biomedical instrumentation systems, and safety in the building, testing, operation, and maintenance of biomedical equipment.
- an ability to select and apply a knowledge of mathematics, chemistry, physics, and biological sciences, engineering, and technology to building, testing, operation, and maintenance of biomedical equipment and the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of biomedical systems.
- an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
- an ability to analyze, design, and implement biomedical systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives.
- an ability to function effectively as a member or leader on a technical team.
- an ability to identify, analyze, and solve broadly-defined biomedical technology problems.
- an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.
- an understanding of the need for and an ability to engage in self-directed continuing professional development.
- an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.
- a knowledge of the impact of engineering technology solutions in a societal and global context and an understanding of the clinical application of biomedical equipment .

- a commitment to quality, timeliness, and continuous improvement.

## 8. Admission Requirements

After completing the preparatory year at the end of the second level, the students in the health sciences category are distributed among the four health colleges.

All students admitted to College Applied Medical Sciences are distributed to various programs of Applied Medical Sciences, so that they can start their designated program requirements in level three. The distribution process to the various programs at CAMS is carried out according to the interest of the students and the capacity of programs. When applicants exceed availability, priority is given to the students with higher grades.

## 9. Graduation Requirements

After ensuring that a student has successfully completed all the course work of 136 credit hours, including 33 credit hours of preparatory year (PY), the program management allows the student to start a one year (50 weeks, 0 credit hours) compulsory internship. When the student successfully completes the internship, he would be eligible for obtaining his Bachelor degree certificate.

### Biomedical Technology-Instruments Curriculum

Year	Course Code	Course Title	Required or Elective	Credit Hours	College or Department
<b>Prep Year Semester 1</b>	ENGL 140	English Language Skills		8	PYP
	MATH 140	Introduction to Mathematics		2	PYP
	CT 140	Computer skills		3	PYP
	MC 140	Communication Skills		2	PYP
<b>Prep Year Semester 2</b>	CHM 145	Introduction to Organic Chemistry		2	PYP
	PHYS 145	General Physics		3	PYP
	ZOOL 145	Biology		3	PYP
	ENGL 145	English for Medical Purposes		8	PYP
	STAT 145	Biostatistics		2	PYP
<b>1<sup>st</sup> Year Semester 1</b>	BMT 211	Biomedical Electronics (I)	<b>Required</b>	4	BMT-I
	BMT 227	Principles of Computing	<b>Required</b>	2	BMT-I
	BMT 222	Applied Mathematics for BMT (I)	<b>Required</b>	2	BMT-I
	BMT 221	Basic Mechanical Skills	<b>Required</b>	3	BMT-I
	BMT 224	Applied Physics for BMT	<b>Required</b>	4	BMT-I
	CLS 224	Rehabilitation Procedures	<b>Required</b>	3	CLS
<b>1<sup>st</sup> Year Semester 2</b>	BMT 212	Biomedical Electronics (II)	<b>Required</b>	4	BMT-I
	BMT 225	Measurement Techniques	<b>Required</b>	2	BMT-I
	BMT 226	Electrical Skills (I)	<b>Required</b>	2	BMT-I
	BMT 223	Applied Mathematics for BMT (II)	<b>Required</b>	2	BMT-I
	BMT 228	Introduction to Biomechanics	<b>Required</b>	2	BMT-I
	BMT 232	Principles of Mechanical Biomedical Instrumentation	<b>Required</b>	3	BMT-I

<b>2<sup>nd</sup> Year Semester 1</b>					
	BMT 313	Biomedical Electronics (III)	<b>Required</b>	3	BMT-I
	BMT 333	Electrical Machines in Medical Instrumentation	<b>Required</b>	2	BMT-I
	BMT 323	Electrical Skills (II)	<b>Required</b>	2	BMT-I
	BMT 336	Optical Biomedical Instrumentation	<b>Required</b>	3	BMT-I
	BMT 337	Biomaterials	<b>Required</b>	2	BMT-I
	BMT 335	Mechanical Biomedical Instrumentation	<b>Required</b>	3	BMT-I
	IC 106	Medical Jurisprudence	<b>Required</b>	2	
<b>2<sup>nd</sup> Year Semester 2</b>					
	BMT 314	Biomedical Electronics (IV)	<b>Required</b>	3	BMT-I
	BMT 315	Introduction to Bioelectrical Instrumentation	<b>Required</b>	2	BMT-I
	BMT 367	Hospital Safety	<b>Required</b>	2	BMT-I
	BMT 334	Biomedical Imaging Equipment	<b>Required</b>	3	BMT-I
	BMT 338	Introduction to Bioengineering Design	<b>Required</b>	2	BMT-I
	RHS 372	Audiology II	<b>Required</b>	2	RHS
	ARAB 103	Expository Writing		2	
<b>3<sup>rd</sup> Year Semester 1</b>					
	BMT 413	Biomedical Electronics (V)	<b>Required</b>	3	BMT-I
	BMT 415	Biomedical Signal Processing	<b>Required</b>	3	BMT-I
	BMT 432	Special Topics on Biomedical Instrumentation	<b>Required</b>	4	BMT-I
	BMT 437	Control Systems in Biomedical Equipment	<b>Required</b>	2	BMT-I
	BMT 484	Automation in Clinical Laboratory	<b>Required</b>	3	BMT-I
<b>3<sup>rd</sup> Year Semester 2</b>					
	BMT 414	Biomedical Electronics (VI)	<b>Required</b>	3	BMT-I
	BMT 485	Biomedical Computing	<b>Required</b>	4	BMT-I
	BMT 468	Clinical Practice / Project	<b>Required</b>	3	BMT-I
	BMT 465	Maintenance Management	<b>Required</b>	2	BMT-I
	RHS 422	Rehabilitation Procedures	<b>Required</b>	2	RHS
	CHS 243	Basic Emergency Care	<b>Required</b>	2	CHS
<b>4<sup>th</sup> Year</b>		Internship	<b>Required</b>	-	
<b>+ 6 hours of electives</b>					
	IC 101	Principles of Islamic culture	<b>Elective</b>	2	-
	IC 102	Family in Islam	<b>Elective</b>	2	-
	IC 103	Economic System in Islam	<b>Elective</b>	2	-
	IC 104	Islamic Political System	<b>Elective</b>	2	-
	IC 105	Human Rights	<b>Elective</b>	2	-
	IC 107	Professional Ethics	<b>Elective</b>	2	-
	IC 108	Cultural Issues	<b>Elective</b>	2	-
	IC 109	Development Role Of Women	<b>Elective</b>	2	-

## 9.1 summary of course description

Course Description				
Course #	Course Title	No of Units		
		L	P	T
<b>BMT 211</b>	Biomedical Electronics I	3	1	4
<b>Definition of charge, current, voltage, energy and power in DC circuits, Basic circuit theorems. R L C circuits. AC circuit analysis. Resonance theory and applications .</b>				

Course Description				
Course #	Course Title	No of Units		
		L	P	T
<b>BMT 212</b>	Biomedical Electronics II	3	1	4
<b>Semiconductors, Diodes, Bipolar and FET transistors biasing circuits, amplifiers and switching circuits.</b>				

Course Description				
Course #	Course Title	No of Units		
		L	P	T
<b>BMT 221</b>	Basic Mechanical Skills	1	2	3
<b>Simple mechanical devices. Engineering drawing basics. Hand tools. Machining processes in metal cutting. Soldering, brazing, welding and adhesion.</b>				

Course Description				
Course #	Course Title	No of Units		
		L	P	T
<b>BMT 222</b>	Applied Mathematics I	2	0	2
<b>Complex numbers. Determinants and Matrices. Simultaneous linear equations. Trigonometric, Exponential and logarithmic functions. Number systems and conversion.</b>				

Course Description				
Course #	Course Title	No of Units		
		L	P	T
<b>BMT 223</b>	Applied Mathematics II	2	0	2
<b>Derivatives of algebraic and trigonometric functions. Maxima and minima of functions. Definite and indefinite integration. Infinite series, analytical and solid geometry. Vector analysis.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 224</b>	Applied Physics	3	1	4
Units and dimensions of physiological parameters. Particle mechanics and fluid mechanics. Optics. Sound and ultrasound. Isotopes, nature and properties of ionizing radiation, dose calculation, protection methods. Lasers. Electromagnetic theory.				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 225</b>	Measurements Techniques	2	1	3
Measurements and errors. System of units. Measuring Instruments as Multimeters and Oscilloscopes. Instruments for measuring basic physical parameters; such as angle, strain, pressure, and viscosity. Static and dynamic performance of instruments and error analysis.				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 226</b>	Basic Electrical Skills	1	1	2
Basic hand tools, common electronic components. Circuit construction and testing. Cathode ray oscilloscope. Use of Test equipment. Component replacement.				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 227</b>	Introduction to Personal Computing	1	1	2
Exploring popular operating, System utilities, Backup software, Antivirus, system updates, Representing data in computers, programming, use of word processing, graphics packages and spreadsheets.				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 228</b>	Biomechanics	2	0	2
Force and equilibrium. Mechanics of body muscle and movements. Orthopedic structures. Body segment parameters. Concepts of body links.				



<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 232</b>	Principles of Mech. Biomed. Instrumentation	2	1	3
<b>Fluid mechanics, Fluid pressure and its measurements. Hydraulic pumps. Applications of continuity and Bernoulli's equations to measuring devices. Thermodynamics and heat transfer.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 313</b>	Biomedical Electronics III	2	1	3
<b>Introduction to integrated circuits. Operational amplifiers, signal conditioning and signal processing circuits. Power electronics. Applications in biomedical instrumentation.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 314</b>	Biomedical Electronics IV	2	1	3
<b>Introductory Concepts, Number Systems And Codes, Describing Logic Circuits, Combinational Logic Circuits, Flip Flops &amp; Related Devices Digital Arithmetic, Digital System Applications</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 315</b>	Introduction to Biopotentials	1	1	2
<b>Origins of biopotentials, genesis of different biopotentials and their parameters. Bioelectrodes. Bioelectric amplifiers and signal processing.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 323</b>	Advanced Electrical Skills	1	1	2
<b>Printed circuit design, generation, and rounding. Computerized design and drafting. Signal tracing, troubleshooting. Introduction to biomedical circuits.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 333</b>	Electrical Machines in Biomedical Equipment	2	0	2
<b>Polyphase systems. Transformers. Motors; construction and principle of operation, speed control of small motors and motor controllers.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 334</b>	Biomedical Imaging Equipment	2	1	3
<b>Basics of digital imaging, different modalities of imaging including X-ray, ultrasound, CT and Nuclear imaging. Design and technologies of different imaging modalities</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 335</b>	Mechanical Biomedical Instrumentation	2	1	3
<b>Operation and construction of mechanical biomedical equipment such as ventilators, respirators, artificial kidney machine, artificial heart, heart-lung machine, and anesthesia equipment.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 336</b>	Optical Biomedical Instrumentation	2	1	3
<b>Microscopes. Light sources and detectors. Signal conditioning. Monochromators. Photometry, emission and absorption spectrometry. Lab. Instrumentation Endoscopy and Laser.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 337</b>	Biomaterials	2	0	2
<b>Mechanical properties of materials. Polymers, metals, ceramics and composites. Fixation, host response, testing and introduction of new materials. Material retrieval and analysis.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 338</b>	Introduction to Engineering Design	2	0	2
<b>Mechanical Design systems and materials selection for implants which is implanted in the human body. Using computers in design and medical simulation.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 367</b>	Hospital Safety	1	1	2
<b>Types and hazards in hospitals and their control. Safety principles and standards. Safety program and insurance.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 413</b>	Biomedical Electronics V	2	1	3
<b>Architecture of microprocessors. Architecture of a specific processor. Assembly language programming. Memory and I/O interfacing. Biomedical applications.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 414</b>	Biomedical Electronics VI	2	1	3
<b>Medical instrumentation. Defibrillator, Pacemaker, Ablation and Electro-surgery, Cardiac Output measurement, EEG, ENG, EMG acquisition and analysis, MRI with 3D image formation.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 415</b>	Digital Signal Processing	2	1	3
<b>Characteristics of biomedical signals. Digital signal processing (operation on signals, convolution, Fourier Transform, Z-transform). Noise detection and reduction. Digital filters. Biomedical applications.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 432</b>	Special Topics in Biomedical Instrumentation	3	1	4
<b>Trends and developments in biomedical instrumentation and systems.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 437</b>	Biological Control Systems	2	0	2
<b>Models of physical systems. Root-locus and frequency response analysis. Biomedical applications.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 465</b>	Maintenance Management	2	0	2
<b>Establishing maintenance procedures. Instrument selection, evaluation and control. Preventive maintenance and failure reporting. Equipment planning. Computerized maintenance management.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 468</b>	Clinical Practice / Project	0	3	3
<b>Treating a biomedical problem through a project work, analyse and design a solution to a biomedical problem, writing a scientific report.</b>				

<b>Course Description</b>				
<b>Course #</b>	<b>Course Title</b>	<b>No of Units</b>		
		<b>L</b>	<b>P</b>	<b>T</b>
<b>BMT 485</b>	Biomedical Computing	3	1	4
<b>Application of computers in medicine such as patient record, clinical laboratory, Radiology. Computer assisted Diagnosis.</b>				

**L:** Lecture credit hours  
**P:** Practical credit hours  
**T:** Total credit hours

## **9.2 Summary of Internship program**

An important component of the BMT-I curriculum is a one-year non-credit mandatory internship that the students experience after completing all their course work. The internship serves as a buffer period for students to merge into the work area. During this internship the students gain valuable practical training in biomedical industrial environment and biomedical units of hospitals.

The department assigns a faculty member who acts as a point of contact for the overall arrangement and supervision of the internship for all interns. However, the interns are primarily supervised by a supervisor from the work area who is mainly responsible for the evaluation of the intern at the end of the internship program. An intern, with the co-ordination of the departmental internship supervisor, can choose to have more than one work areas during the one-year internship program. For each period an evaluation report is mandatory. CAMS has a standard intern evaluation reporting form which is used by the field supervisor to evaluate the intern. The field supervisor monitors three major skill categories, namely, knowledge of work & working abilities, quality and quantity of work, and general performance. The internship evaluation report is directly sent to the department with high confidentiality. An overall performance evaluation of good and above should be obtained by the intern in order to be approved for graduation requirement. If an intern receives a poor performance evaluation, then he should repeat the internship or the part of internship where spent in that working area.

## 10. Laboratories

The BMT-I curriculum includes laboratory courses in biomedical instrumentation, electronics basics, optical instrumentation and physics, digital electronics and microprocessor, biomedical simulation, signal processing, mechanical equipment and biomechanics.

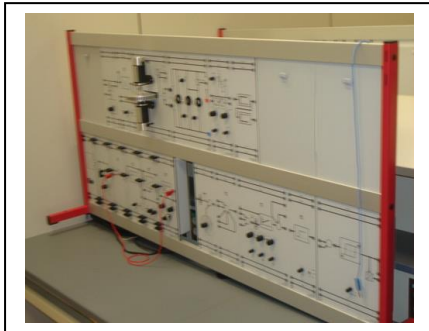
- **Biomedical Instrumentation Lab:** Covers the following experiments: fluid mechanics, fluid pressure and its measurements, hydraulic pumps, applications of continuity and Bernoulli's equations to measuring devices, thermodynamics and heat transfer, origins of bio-potentials, genesis of different bio-potentials and their parameters, bio-electrodes, bioelectric amplifiers and signal processing, clinical biomedical equipment and 3D printing.
- **Digital Electronics and Microprocessor Lab:** Covers the following experiments: basic hand tools, common electronic components, circuit construction and testing, cathode ray oscilloscope, use of test equipment, component replacement, architecture of microprocessors, architecture of a specific 16-bit processor, assembly language programming, memory and I/O interfacing, biomedical applications, circuit analysis and simulation using ORCAD Pspice simulation and PCB design using ORCAD layout plus.
- **Electronics Basics Lab:** Covers the following experiments: basic circuit theorems, nodal and mesh analysis, RLC circuits, natural and steady state response, AC circuits, resonance, solid state electronics, diodes, bipolar and FET transistor as amplifiers, measurements skills (oscilloscope, multimeter, function generator), basic electronic designs & tests, digital circuits designs & tests and PCB assembly and tests.
- **Optical Instrumentation Lab (For Optics & Physics):** Covers the following experiments: microscopes, light sources and detectors, photometry, emission and absorption spectrometry, instrumentation endoscopy, laser, measuring reaction time, free fall, Millikan oil-drop, diffraction grating, refraction, wave model of light vs. the quantum model, the relationship between energy, wavelength and frequency, light polarization, determine the focal length of a simple lens, Bragg's reflection and Duane-Hunt relation and determination of Planck's constant.
- **Biomedical Simulation Lab:** Covers the following experiments: integrated circuits, operational amplifiers, signal conditioning and signal processing circuits, power electronics, characteristics of biomedical signals, noise detection and reduction, analog and digital signal processing and digital filters.
- **Biocontrol lab:** Covers the following experiments: polyphase systems, transformers, motors, construction and principle of operation, speed control of small motors and motor controllers, root-locus and frequency response analysis and biomedical applications.
- **Computer Lab:** Covers the following experiments: programming, use of word processing, graphics packages and spreadsheets.



Electronics lab



Digital electronics lab



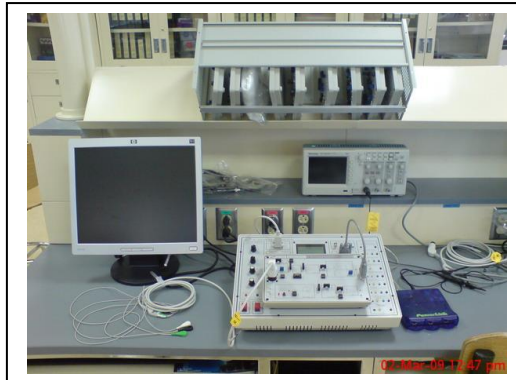
Control lab



Advanced Electronics lab



Biomedical Equipment lab



Computer lab

## 11. Faculty

**Department Head:** Dr. Omar Altwijri

No.	Name	Rank	Contact
1.	Dr Nabil Ben Ali Alrajeh	professor	4693661
2.	Dr. Ali Ben Saleh Almejrad	Associate professor	4693663
3.	Dr. Mohamed Ben Hamad Almejali	Associate professor	4693669
4.	Dr. Ali Samir Saad	Associate professor	4693772
5.	Dr Mahdi AlQahtani	Associate professor	4694744
6.	Dr. Saleh ben Sulaiman Altayyar	Assistant professor	4693655
7.	Dr. Ali Alenizi	Assistant professor	4693652
8.	Dr. Omar Altwijri	Assistant professor	4693654
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