Physics Undergraduate Studies Handbook

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Department of Physics

Physics Undergraduate Studies Handbook

Department of Physics

Faculty of Science

King Abdulaziz University

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April, 2021

Contact us

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Acknowledgements

We want to express our most profound appreciation to the head of the department, Prof. Ahmed Alshehri. We would also like to extend our deepest gratitude to the chair of the Quality and Academic Accreditation Committee in the department, Dr. Bassim Arkook, and extremely grateful to the faculty members of the Physics Department for their support and assistance in preparing the handbook.

Abstract

The Physics Undergraduate Studies Handbook is intended to overview and reflect the policies and procedures regarding undergraduate students in the Department and answer most of their questions. In addition, it outlines the Department of Physics academic requirements for the Bachelor of Science (B.Sc.) program. However, as in all KAU Departments, the University established and administered many policies and procedures. Therefore, for detailed information on policies regarding undergraduate students at KAU, the policies and procedures of KAU should be consulted.
For further references, see KAU Regulations and Policies

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Chapter 1

Introduction

1.1 Welcome from the head of the department

Welcome to the Department of Physics at King Abdulaziz University (KAU). Our pleasure and an excellent opportunity to contribute to the Department's handbook through these simple words and shed some light on the physics department at King Abdulaziz University. The purpose of this handbook is to provide current students with a detailed description of the Physics programs that apply to the academic year 2020-2021.

Physics is the ability to examine the natural phenomena that arise from the material, movement, and energy and the interactions between them, in addition to other concepts such as space and time, including deals this science with the characteristics of cosmic we could be measured, such as power and energy, mass and charge, and generally aims of physics to interpretation and characterization these natural phenomena and the laws that govern the universe from the atom to the galaxy through the proposals rise to the hypotheses and theories of viable and non-viable Test.

This handbook describes the framework of the course and its assessment, and we hope that the handbook contains sufficient information for all students' questions.

1.2 History of the Department

The Department of Physics was founded with the Faculty of Science establishment in 1973 (1393 AH), including the Astronomy Division until 1978 (1399 AH). Then

the Astronomy Division became an independent department and entirely separated from the Department of Physics. The department grants a Bachelor of Science degree (B.Sc.) and Master of Science degree (M.Sc.) from its establishment. In 2010, the department beginning to be awarded a Doctor of Philosophy degree (Ph.D.).

1.3 List of former Department Chairmen

1. Prof. Abdel Al-Fattah Abdulmaksoud Al-Nadi (1973-1974).
2. Prof. Fathi Ahmed Al-Budaiwi (1974-1975). See figure 1.1.
3. Dr. Fawaz Abdullsattar Al-Hasani (1975-1976). See figure 1.2.
4. Prof. AbdulAziz Ali Muhammad (1976-1977). See figure 1.3.
5. Dr. Khalid Ali Kamakh (1977-1979). See figure 1.4.
6. Prof. Ali Helmy Moussa (1979-1981). See figure 1.5.
7. Prof. Mohammed Ahmed Al-harbi (1981-1984). See figure 1.6.
8. Prof. Othman Hassan Al-Mufti (1984-1986). See figure 1.7.
9. Prof. Mohammed Ahmed Al-harbi (1986-1989). See figure 1.6.
10. Dr. Saud Jameel Yaghmour (1989-1990). See figure 1.8.
11. Dr. Ghali Ghazi Al-Barakati (1990-1992).
12. Dr. Ali Mohammed Alsanoosi (1992-1995). See figure 1.9.
13. Prof. Fahad Masoud Al-marzouki (1995-2000). See figure 1.10.
14. Dr. Mohammed Riyadh Arafah (2000-2002). See figure 1.11.
15. Prof. Farag Saeed Al-hazmi (2002-2008). See figure 1.12.
16. Prof. Fahad Masoud Al-marzouki (2008-2016). See figure 1.10.
17. Prof. Ahmed Alshahrie (2016-present). See figure 1.13.

1.4 Vision of the Department

Excellence in physical sciences and building a knowledge society.

1.5 Mission of the Department

Department of Physics grants outstanding physics knowledge to the graduates and raises their physics knowledge confidence. The Department of Physics supports both experimental and theoretical research and investigation, including assists faculty in productive projects. The Department of Physics involves community services through contributing courses and training in physical science practiced in daily life.

1.6 Goals of the Department

Distinguished cadres in science.

Distinguished cadres in research.

Planning new programs.

Serving Community.

1.7 Academic and Administrative staff

Table 1.1: Academic and Administrative staff in the Physics Department.

Position	**Name**	**Contact**
Head of Department	Prof. Ahmed Alshahrie	x67022 | aalshahri@kau.edu.sa
Supervisor of Girls	Dr. Nora Alsenany	x63287 | nsenany@kau.edu.sa
Office Manager	Mr. Ahmed Alghamdi	x62098 | physics@kau.edu.sa
Office Manager (Girls)	Ms. Rowaida Abdulrazzaq	x63286 | scig.physics@kau.edu.sa
Quality & Accreditation Committee	Dr. Bassim Arkook	x51610 | barkook@kau.edu.sa
Media Committee	Dr. Bassim Arkook	x51610 | barkook@kau.edu.sa

Graduate Studies Committee	Dr. Said Al Said	x62098 | salsaid@kau.edu.sa
Advisory Committee	Dr. Abdullah Alshaikhi	x62098 | aalshaikhi@kau.edu.sa
Exit Exam Committee	Prof. Abdulkadir Al-Aydarous	x67521 | aalaydarous@kau.edu.sa
Hiring Committee	Prof. Ahmed Alshahrie	x67022 | aalshahri@kau.edu.sa
Training Committee	Dr. Majid Alotaibi	x62098 | malhabrdi@kau.edu.sa
Training Committee (Girls)	Dr. Nuha Alhebshi	x41805 | nalhebshi@kau.edu.sa
Scheduling Committee	Prof. Ahmed Alshahrie	x67022 | aalshahri@kau.edu.sa

1.8 Industrial Advisory Board

1. Prof. **Ahmed Alshahrie**, Department of Physics, King Abdulaziz University. (Head of Department).
2. Dr. **Nora Alsenani**, Department of Physics, King Abdulaziz University. (Faculty Member).
3. Prof. **Yas Alhadeethi**, Department of Physics, King Abdulaziz University. (Faculty Member).
4. Dr. **Bassim Arkook**, Department of Physics, King Abdulaziz University. (Faculty Member).
5. Dr. **Arwa Kutbee**, Department of Physics, King Abdulaziz University. (Faculty Member).
6. Eng. **Ramzi Almaydhan**, Future Technology Company. (Chairperson).
7. Mr. **Fahed Aljad'ani**, Saudi Standards, Metrology and Quality Organization. (Head of Department).
8. Dr. **Salem Ahmed**, Ministry of Education. (Head of Department).
9. Dr. **Rashed Alessa**, Research and development at Saudi Aramco.
10. Dr. **Mosaad Almutairi**, Saudi Standards, Metrology and Quality Organization. (Head of Department).

11. Prof. **Maha Khayyat**, King Abdulaziz City for Science and Technology (Consultant).
12. Ms. **Aliyah Alshamrani**, Ministry of Education. (Teacher).
13. Mr. **Ahmed Halwani**, Department of Physics, King Abdulaziz University. (Alumni).
14. Ms. **Sireen Sendi**, Department of Physics, King Abdulaziz University. (Student).

1.9 List of Committees and their Tasks

1.9.1 Advisory Committee:

First: The duties of the committee chair:

- Approving the admission of new students and transferring students according to the conditions approved by the department.
- Distribution of students to Academic Advisors, taking into account a review of the distribution for each semester.
- Coordination with the department's supervisor to electronically distribute academic guidance on the Odus Plus system.
- Creating a database for all the department students, which includes the students' names - the university number - the mobile phone, and the mentor of each student.
- Study the case of female graduate students and review and print the matching of their study plan at the beginning of the graduation semester.
- Supervising the registration, deletion, and addition process for female students at the beginning of the semester, and ensuring their commitment to the department's registration list.
- Follow up the registration process in the divisions in general and coordinate

with the department supervisor and the schedules committee to request the division's expansion or closure or the opening of new divisions as needed.

- • Coordination with the academic guides by making an inventory of female students expected to graduate and who need an increase in the number of maximum hours in the academic schedule (no more than 3 hours exceed the maximum) And by raising it to the educational affairs unit in the faculty with their names and the number of hours required And the registration form for the materials to be added And the matching of the study plan is up to date.
- Receive the proposed initial tables for the female students for the next semester from the Academic Advisors and deliver them to the Schedules Committee to prepare the schedules for the next semester.
- Coordination with the academic guides by making a statistical statement about the students' needs of the courses and the number of people for the next semester and handing them over to the Schedules Committee.
- Coordination with the academic guides by making an inventory of the numbers of students expected to graduate in the next semester, their need for study materials and their dates, and submitting that to the Schedules Committee.
- Preparing a quarterly report on the achievements and difficulties faced by the committee.

Second: Tasks of the academic counselor:

- Helping students suitably plan in selecting the materials and urging them to adhere to the study plan.
- Follow-up of the additions and deletions of the students and make sure that all the additions and deletions were with her consent and knowledge.
- Supervising the implementation of the form for deletion and addition of materials that the student could not add or delete through the Odds Plus system.
- Directing the deletion and addition forms that were not implemented to the

Educational Affairs Unit after approval to do the necessary with clear notes on them during the time allotted for registration.

- • Make an inventory of students who are expected to graduate and who need an increase in the number of maximum hours in the academic schedule, and accordingly submit it to the chairperson of the committee with mentioning their names and the number of hours required (not exceeding 3 hours above the maximum) and the registration form for the subjects to be added and signed by the student and academic advisor.
- Review the students 'schedules after the add and drop period ends, and communicate with the students to ensure that they match the schedules they have and the necessity of signing them on the academic schedule they have and keeping it until the end of the semester.
- Preparing the proposed initial schedules for female students for the following semester with the relevant form and submitting it to the committee chairperson.
- An enumeration of the numbers of students expected to graduate in the next semester and their need for study materials, and deliver that to the head of the committee.
- Provide the chairperson of the committee with any update of the female students 'information, including the transfer of any student from the department, to update it with the department's female students' database.

1.9.2 Scheduling Committee:

This committee is concerned with preparing the schedules in the department and its belongings, and among its tasks:

- Receive a copy of all inventory tables from the Academic Advising Coordinator in the department for reference when needed.
- Review and audit the numbers included in the inventory form.

- Collecting optional course requests, if any, from the counseling coordinator in the department.
- Distributing the materials to the department faculty members under the supervision of the head or supervisor of the scientific department.
- Creating tables following the requirements and data.
- After completing the schedules, a copy will be sent to technical support to reserve the laboratories on the specified dates and ensure their availability.
- Send an electronic copy of the initial schedule to the head or supervisor of the scientific department and the department mail (secretarial).
- Putting an initial copy of the tables for students in the department board and publishing it among the students through mentors and teachers of the materials to ensure their suitability
- For everyone before its adoption and to find alternative solutions for defaulters. Resolve conflicts and errors, if any.
- After approving the appointments by the technical support, a copy of the schedule for educational affairs is sent by the department for approval and creation in the system.
- If there are subjects taught through the network, the subjects to be taught are sent to the boys' department by e-mail.
- For network building administrators to book appointments
- Review copies of the tables created by the educational affairs in the system and review the amendment, if any.
- Follow-up requests to expand the people, if any, and send them to educational affairs for approval in the system.
- Sending a copy of the tables to the Academic Advising Officer in the Scientific Section for circulation to the academic advisors.

- Review the teaching load of the department's employees and ensure that it matches their schedules.

1.9.3 Curriculum Committee:

This committee is concerned with curriculum development, and it is recommended to assign - at least - two members of the Teaching and Learning Committee to this committee as members participating in it, It is her duty:

- Taking the necessary adjustments in the program after reviewing it, and the content of the courses and the primary references and assistance to the decisions after their discussion in
- The scientific department council, and amending the descriptions concerned with change according to the models of the academic evaluation and accreditation bodies approved in the department.
- Hiring consultants from academics, professions, and jobs related to the program, coordinating with the Program Management Committee.
- Preparing program, course, and matrix description according to the models of academic evaluation and accreditation bodies approved in the department, with
- Discussing it with the Scientific Section Council and submitting recommendations to the Development Agency - Quality and Academic Accreditation Unit.
- Ensure that the curriculum study plans and teaching strategies are consistent with the targeted learning outcomes and the requirements of the national framework
- Annually reviewing the goals, requirements, and strategies of teaching and learning for the program, academic services, and extra-curricular activities.
- Work for the program to have a development plan based on the annual evaluation results that support the college's development plans.
- Follow-up to develop the academic courses for the science department's pro-

grams according to the results of scientific research while completing the internal and external review And comparison Bookmark with similar software locally and internationally.

- Conducting development research to create undergraduate and postgraduate programs in line with the requirements of the labor market and global trends.
- Evaluating, accepting, or rejecting proposals for new programs or substantive amendments to the program by the Learning and Teaching Committee of the Scientific Department.
- Submitting a quarterly report on the committee's achievements, including annexes of records and evidence, and presenting the report to the Learning and Teaching Committee in the Scientific Department.

1.9.4 Graduate Studies Committee:

This committee is concerned with graduate studies programs in the department, and among its tasks:

- Follow up on updating the description of the scientific material and its content.
- Arranging an informative day for postgraduate students to explain the regulations and conditions.
- Coordination of a quarterly meeting for students with the head or supervisor of the department.
- Collecting the content of scientific materials in the data bank and updating it annually.
- Writing admission tests for graduate programs in the department with the help of faculty members.
- Follow up the placement of materials in classrooms with the graduate studies unit in the college.
- Create final exam schedules.

- Following up the accommodation of final examination halls with the graduate studies unit in the college.
- Work with the College's Graduate Studies Unit to prepare a list of research topics and supervisors.
- Coordination for (seminars) for students in the department and announcing it to students and supervisors.
- Preparing evaluation forms for the program (academic subject, academic supervisor, subject teacher).
- Working to improve graduate studies programs.
- Submit proposals for improving scientific research processes in graduate studies programs.
- Acting as an executive body for the department in matters related to the curriculum, programs, and courses of graduate studies.
- Setting an integrated mechanism to ensure the quality of the educational process in graduate studies programs.
- Be present in the add and drop period and take the necessary measures in preparation for it.
- Follow-up of the initial registration and the period of adding and dropping students.
- Supervising the implementation of academic advising procedures and instructions and following up with the counselors.
- Developing a plan for counseling in the department in coordination with the mentors.
- Inventory, review, and approval of students' schedules.
- Utilizing the scientific research results published by faculty members in the postgraduate program curricula.

- Providing the Scientific Research Committee with training needs, in coordination with the College Vice Deanship for Postgraduate Studies and Scientific Research.
- Determine the challenges facing students and provide solutions to address them.
- Attending the induction meeting of the Vice-Dean for Graduate Studies and Scientific Research with postgraduate students.

1.9.5 Laboratories Committee:

- Creating a file for the scientific department laboratories that includes the procedures and models and all that is related to the course of the instruction process inside the laboratory.
- Ensure the safety and security procedures inside the laboratories.
- Attending educational sessions on good behavior during emergencies and disasters.
- Preparing executive plans to develop and maintain devices and maintain them in cooperation with the competent authorities.
- Raise maintenance requests and transfer the notables in charge of maintenance.
- Schedule regular maintenance appointments for laboratories and replace damaged equipment and materials at the end of each semester.
- Preparing a quarterly agenda showing the maintenance work that has not been carried out and preparing the agenda in the summer period for maintenance work.
- Fill out the inventory and return forms and submit them to the college warehouse official.
- Receiving suppliers of orders for training on new devices in coordination with the college official.

- Follow up the workflow in the laboratories to ensure the quality of the products and to know the daily needs.
- Supervising the cleanliness and readiness of the laboratories for study.
- Operating (data show) devices in the department's laboratories.
- Completion of procedures for destroying old and unfit for display.
- Follow up the laboratories' needs of devices and supplies in coordination with the coordinators of the faculty and supervise their supply and installation.
- Receive the envelopes and study the companies' offers, considering the quality and the reasonable price, in coordination with the college official.
- Counting the annual restoration requests for the department's laboratories and submitting them to the concerned authority.
- Appointing a responsible for the warehouse department of storing, delivering, and receiving devices and tools.
- Receiving the works to be displayed in the internal and external exhibitions and the procedures for their transfer, organizing their display, returning, and delivering them accordingly.
- The directives of the head or supervisor of the department.
- Programming, delivery, and receipt of lab cards, if any.

1.9.6 Quality and Accreditation Committee

- Fill in the axes, practices, and indicators of the program of evaluation and quality assurance of university performance and documenting them electronically with the head or supervisor of the scientific department.
- Collecting evidence and evidence that achieves practices and indicators from the operational committees to be filled out in the system.
- Submit an electronic copy of the contents of filling out a program EQUAP for Development Agency - Quality and Academic Accreditation Unit.

- Ensure that the accreditation standards files are completed in the Development Agency's Quality and Academic Accreditation Chamber.
- Presenting an annual report that includes strengths, weaknesses, and improvement plans, presenting it to the Scientific Department Board, and submitting recommendations to the Development Agency - Quality and Academic Accreditation Unit.
- Prepare a quarterly report on the achievements.

1.9.7 Exit Exam Committee:

The exit exam is an academic performance indicator for the student to graduate soon from the program. These exit exams show the impact on different elements of the educational process, specifically: curriculum development, students, and instructors. The exit exam is a multiple-choice prepared by the committee members covering the primary subjects in Physics.

1.9.8 Hiring Committee:

This committee reviews the submitted job applications by studying the applicant's CV and ensuring the published research and the major/minor. This committee can also communicate with the candidate if they wish to interview him/her by phone or online. Finally, the committee submits the names of the candidates to the head of the department to send them to the human resources (HR) department.

1.9.9 Media Committee:

This committee sponsors the department's official website and the department's official accounts on social media by publishing all important news related to students and department employees.

1.9.10 Training Committee:

This committee takes care of students during their training course study by facilitating their enrollment in certain training bodies and sending the necessary letter. The committee also follows up on the students during the training period. At the end of the training period, the committee requests a report from the training authority explaining the student's performance. Through this, the committee requests an offer to be submitted by the student after his training course.

1.10 Location of the Department

Main campus for male student:
Department of Physics, 3rd floor,
Faculty of Science, bldg. A90.
Main campus for female student:
Department of Physics, 2nd floor,
Faculty of Science, bldg. 7.

1.11 Important Locations in the Department

Name	Room#	Building
Physics Administrative Offices	3019	A90
Physics Conference Room	3035	A90
Physics Club	1017	A90
Accreditation Committee	282	115
Departmental Library	291	115

Table 1.2: Important Offices and Rooms.

Name	Room#
PHYS 281 Lab	16I18
	16I12
	16I11
	16I19
	16I09
	16I21
	16I08
	16I04
PHYS 202 Lab	26I33
	26I32
	26I16
	26I33
PHYS 203 Lab	34I26
Electronics Lab	36I33
Optics Lab	26I15
Modern Physics (I) Lab	36I16
Modern Physics (II) Lab	36I35
Nuclear Physics Lab	36I42
Solid-State Physics Lab	36I15

Table 1.3: Teaching Laboratories at Building A90.

Name	Room#
PHYS 202 Lab	34-B
PHYS 203	35-B
PHYS 281	35-C
Circuit Lab	24-B
PHYS 281	33-C
Nuclear Physics Lab	39-A
Laser Physics Lab	24-C
Optics Lab	45-B
Material Physics Lab	24-C
Modern Physics Lab	25-C
PHYS 281 Lab	32-C
Solid state Physics Lab	34-C
Medical Physics Lab	35-B

Table 1.4: Teaching Laboratories at Building 7 (Female Section).

Name	Room#
Innovations Exhibition	127
Physical Vapor Deposition	122
Chemical Vapor Deposition	118
Laser Optics Lab	217
Semiconductor devices Lab	215
Material Science Lab	213
Optoelectronics Lab	207
Advanced Nuclear Lab	294
X-Ray Diffraction Lab	285
Sample preparation Lab	286
Low Temperature Lab	287
Thermal Evaporation Deposition	288
Ellipsometry Lab	289
The cleanroom facility	124
Machine-shop	201
Computing and Software	209

Table 1.5: Research Laboratories at Building 115.

Figure 1.1: Prof. Fathi Ahmed Al-Budaiwi.

Figure 1.2: Dr. Fawaz Abdullsattar Al-Hasani.

Figure 1.3: Prof. AbdulAziz Ali Muhammad.

Figure 1.4: Dr. Khalid Ali Kamakhi.

Figure 1.5: Prof. Ali Helmy Moussa.

Figure 1.6: Prof. Mohammed Ahmed Al-harbi.

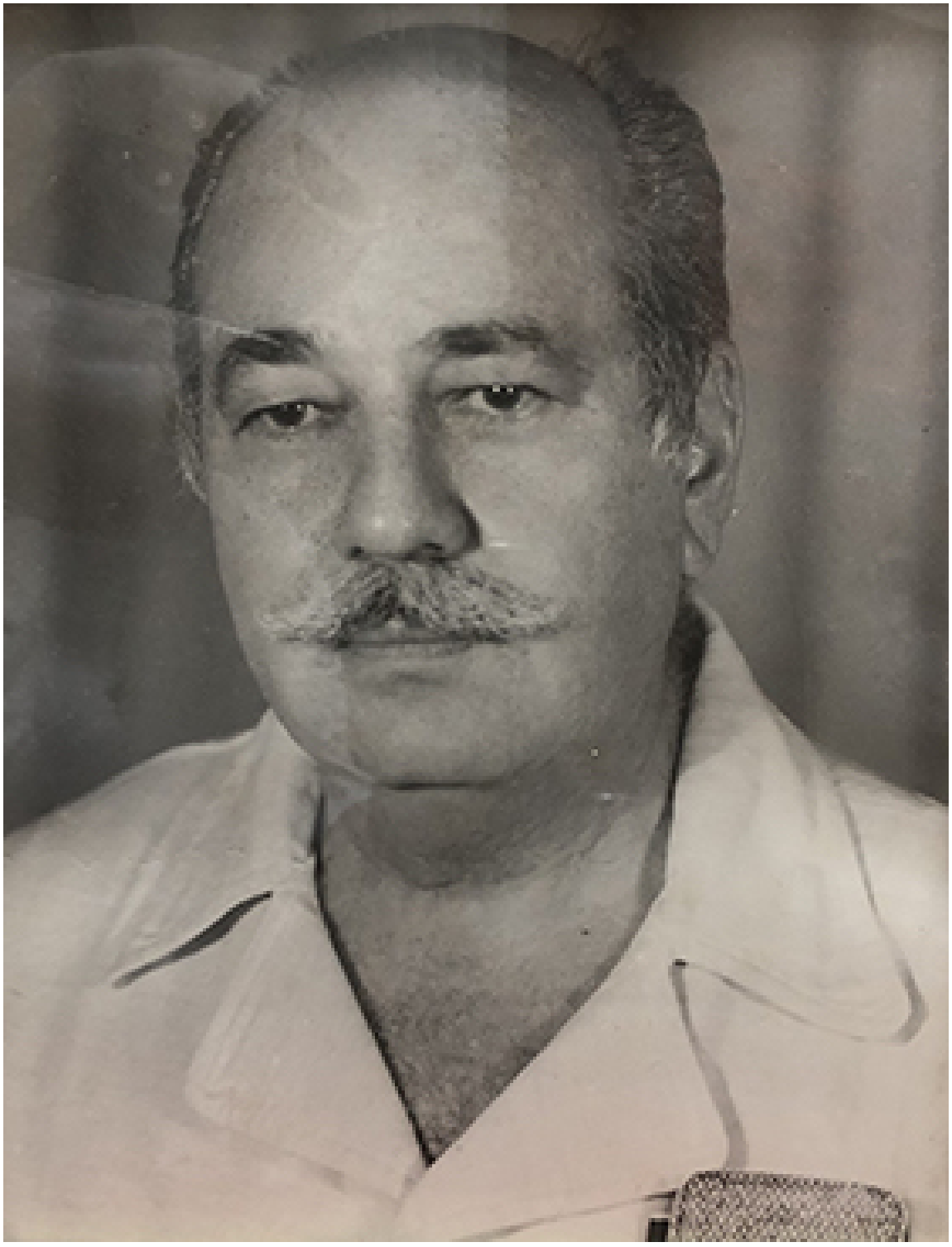

Figure 1.7: Prof. Othman Hassan Al-Mufti.

Figure 1.8: Dr. Saud Jameel Yaghmour.

Figure 1.9: Dr. Ali Mohammed Alsanoosi.

Figure 1.10: Prof. Fahad Masoud Al-marzouki.

Figure 1.11: Dr. Mohammed Riyadh Arafah.

Figure 1.12: Prof. Farag Saeed Al-hazmi.

Figure 1.13: Prof. Ahmed Alshahrie.

Chapter 2

Academics

2.1 History of the Undergraduate program

The Department of Physics offers a bachelor's degree program (B.Sc.) in Physics since 1973. The Department of Physics provides a favorable academic environment for its students with state-of-the-art physics labs. In addition, the department has specialized faculty members in various scientifically grounded application areas. Interestingly, many faculty members obtained their Ph.D. from well-known universities in the United States, UK, and Europe.

2.2 Admission and Registration

King Abdulaziz University (KAU) allows students to join the various faculties and obtain a bachelor's degree. Furthermore, admission into the university is according to the vacant seats, students' percentages in the high school, or the weighted percentage of students; King Abdulaziz University aspires to graduate qualified national cadres able to promote progressive development of the country.

For further information regarding the KAU admission requirements, please visit the following website [**admission.kau.edu.sa**].

2.2.1 Admission to Physics Program

The student must successfully pass the preparatory year before joining the Physics department and meet the following requirements:

1. Passing the Physics course [**PHYS 110**] with a score of **70** or higher.
2. Passing the Math course [**MATH 110**] with a score of **70** or higher.

A student can apply for admission to the physics department by visiting the educational affairs office at the College of Science or by sending a softcopy of the university ID card with the certified transcript through the WhatsApp to the following number **0548366666**.

2.2.2 Admission to Medical Physics Program

In addition to the qualifications of admission to the Physics department, the student must meet the additional requirements in order to join the Medical Physics program:

1. Passing the Physics course [**PHYS 202**] with a score of **80** or higher.
2. Passing the Math course [**MATH 202**] with a score of **80** or higher.
3. Passing the **English** courses with a score of **70** or higher.

A student can apply for admission to the Medical physics program by submitting a petition to the educational affairs office at the College of Science through ERS system [**ers.kau.edu.sa**].

2.2.3 Course Registration

All students must register for their courses online using **Odus Plus** system [**odusplus-ss.kau.edu.sa**], and after having academic advising from the Physics department, the following explains some of the useful information that helps the students to complete the registration:

1. The student must have information on the dates, beginning, and ending of the course registration.
2. Using **Odus Plus** system, the scheduled dates of the respective course group are included in the academic calendar.
3. The student may have access to teaching material (By **Blackboard**) and stu-

dents will be notified automatically by email whenever they are changed or canceled or posted in the course dashboard.

4. The student will be able to participate in the course evaluation survey. Additionally, email invitations for the course evaluation will be sent to all the students registered in the course.

5. The lecturer information can be posted in the **Odus Plus** to all registered students.

6. The minimum hours for course registration for undergraduate students is (**12**) credit hours per semester, and the maximum limit is (**18**) credit hours. It can be overridden to raise the maximum if the student is expected to graduate to (**22**) credit hours.

7. In any case, each student is responsible for their course registrations regardless of the academic advisor engages with the student or not.

2.3 Evaluating Student Performance

The student's performance in courses is evaluated every semester. Table 2.1 shows the mapping of course marks to the letter grades and GPA.

Range of Marks	Grade	GPA
From 95 to 100	A+	5.00
From 90 to 94	A	4.75
From 85 to 89	B+	4.50
From 80 to 84	B	4.00
From 75 to 79	C+	3.50
From 70 to 74	C	3.00
From 65 to 69	D+	2.50
From 60 to 64	D	2.00
Less than 60	F	1.00

Table 2.1: KAU Grading System.

2.4 Office hours

All faculty members have assigned office hours where students can seek additional individual assistance; these are displayed on their office doors. In addition, students can contact faculty using contact details such as email and office phone numbers listed in the **ODUS Plus** system. The **ODUS Plus** system can also be used to schedule official meetings within office hours. Students may also contact faculty outside these hours as needed.

2.5 Teaching load

The teaching load for a faculty member in the Department of Physics is following the teaching load of KAU, where the maximum limit of units for faculty members is as follows:

- Professor **10** teaching units.
- Associate Professor **12** teaching units.
- Assistant Professor **14** teaching units.
- Lecturer **16** teaching units.
- Teaching assistant **16** teaching units.

2.6 Attendance

To encourage regular course attendance, KAU requires its students to attend at least 75% of their lectures and practical sessions. Students failing to meet this requirement in any of their courses are prohibited from attending the final examination and will acquire a DN. Furthermore, students who remain absent in the final examination of a course will not be given a substitute examination unless they provide a valid reason, approved by the College Council.

2.7 Transfer Students and Transfer Courses

KAU has laid down its policies and procedures for transfer students from other universities, within different KAU faculties, or different programs. In what follows, we first summarize the transfer policies from other universities to KAU, then from other faculties within KAU to the College of Science, and finally from the other programs in the college to the physics program.

2.7.1 Transfer from Other Universities

A student may transfer from other universities to the physics program at KAU if the following conditions are satisfied:

- The academic degree pursued by the student at the original university is sufficiently equivalent to the degree granted by KAU.
- The student should have a minimum GPA of 3.0 out of 5.0 or equivalent.
- The student should not have been dismissed for disciplinary reasons from the institution they are transferring from.
- The student must complete in the physics program at least 50% of the credit units required by the KAU degree.
- Transfer students may transfer the courses taken in their previous institution if they are deemed equivalent to the corresponding courses in the physics program as determined by the program Curriculum Committee.
- Transfer courses are listed in the transcript but will not contribute to the student's cumulative GPA at KAU.

2.7.2 Transfer of Students within KAU

A student may transfer from only the Science-Track of KAU to the Faculty of Science if the following conditions are met:

- A GPA not lower than 3.0 out of 5.0.

- The student has completed at least one full academic semester (beyond PY) at the other College.
- Grades earned for the courses taken by a transfer student in the previous College are accepted and considered in the students' degree.

2.7.3 Transfer of Students within the Faculty of Science

A student may transfer from one program to another within the Faculty of Science if (s)he has not completed more than 50% of the credit units required in the current program. The transfer is competitive and is based on the available seats in the sought program and the student's GPA. The transfer is administered by the College Vice-Dean of Academic Affairs office, and priority is given to the top rank students based on their GPA. The student's previously taken courses remain in the student's record and are included in the GPA calculation.

2.8 Leave of Absence

Leave of absence should a degree student find it necessary to interrupt active pursuit of the degree, they may petition the dean for a leave of absence for a specific period, generally limited to one calendar year. The following rules apply:

- Requests are submitted in advance of the year or semester concerned.
- Students are not allowed to discontinue the first two semesters of their enrollment in the university.
- The maximum number of leaves is three academic semesters.

2.9 Graduation Requirements

Our program awards a Bachelor of Science in physics degree upon successful completion of 128-credit hours, with a minimum GPA of 3.00 out of 5.00. These 128-credit hours are further divided general university requirements, College requirements, and program requirements as depicted in following tables 2.2, 2.3, 2.4, 2.5, 2.6 and 2.7.

Requirements	Credit Hours
University	26
Preparatory Year	15
College : Core Courses	9
College : Free Courses	6
Program : Core Courses	63
Program : Elective Courses	9
Total Credit Hours	128

Table 2.2: Graduation Requirements for the Degree Program.

Course#	Course Name	Units
ISLS 101	ISLAMIC CULTURE (1)	2.0
ISLS 201	ISLAMIC CULTURE (2)	2.0
ISLS 301	ISLAMIC CULTURE (3)	2.0
ISLS 401	ISLAMIC CULTURE (4)	2.0
ARAB 101	ARABIC LANGUAGE (1)	3.0
ARAB 201	ARABIC LANGUAGE (2)	3.0
ELCS 101	ENGLISH LANGUAGE (1)	3.0
ELCS 102	ENGLISH LANGUAGE (2)	3.0
COMM 101	COMMUNICATION SKILLS	3.0
CPIT 100	INTRO TO COMPUTER SCIENCE	3.0
	Total	26.0

Table 2.3: University Requirements (26 credits).

Course#	Course Name	Units	Prerequisite
MATH 202	CALCULUS (2)	4.0	PHYS 110 + MATH 110
PHYS 200	SAFETY LAB	1.0	NONE
PHYS 281	PHYSICS LAB (1)	1.0	PHYS 110
CHEM 281	CHEMISTRY LAB (1)	1.0	CHEM 110
PHYS 390	TRAINING	2.0	DEPT. APPROVAL
	Total	9.0	

Table 2.4: College Requirements (9 credits).

Course#	Course Name	Units	Prerequisite
PHYS 202	GENERAL PHYSICS (2)	4.0	PHYS 110 + MATH 110
PHYS 203	GENERAL PHYSICS (3)	4.0	PHYS 110 + MATH 110
PHYS 221	THERMODYNAMICS	3.0	PHYS 203 + MATH 202
PHYS 241	MODERN PHYSICS (1)	3.0	PHYS 202 + MATH 202
PHYS 251	MATHEMATICAL PHYSICS (1)	4.0	PHYS 202 + MATH 202
PHYS 252	CLASSICAL MECHANICS (1)	3.0	PHYS 110 + MATH 202
PHYS 311	OPTICS	3.0	PHYS 241
PHYS 213	ELECTRONICS CIRCUIT (1)	3.0	PHYS 202 + MATH 202
PHYS 331	ELECTROMAGNETISM (1)	3.0	PHYS 202 + PHYS 251
PHYS 332	ELECTROMAGNETISM (2)	3.0	PHYS 331
PHYS 342	MODERN PHYSICS (2)	3.0	PHYS 252 + PHYS 251 + PHYS 241
PHYS 352	MATHEMATICAL PHYSICS (2)	4.0	PHYS 251
PHYS 353	CLASSICAL MECHANICS (2)	3.0	PHYS 252
PHYS 354	QUANTUM MECHANICS (1)	3.0	PHYS 342+PHYS 353
PHYS 381	MODERN PHYSICS LAB	1.0	PHYS 200+PHYS 241
PHYS 382	ELECTRONICS LAB	1.0	PHYS 200+PHYS 312
PHYS 383	OPTICS LAB	1.0	PHYS 241
PHYS 456	STATISTICAL MECHANICS	3.0	PHYS 221+PHYS 354
PHYS 461	NUCLEAR PHYSICS	3.0	PHYS 354
PHYS 471	SOLID STATE PHYSICS	3.0	PHYS 354
PHYS 484	NUCLEAR PHYSICS LAB	1.0	PHYS 461+PHYS 200
PHYS 485	SOLID STATE PHYSICS LAB	1.0	PHYS 471+PHYS 200
	Total	60.0	

Table 2.5: Major Requirements, Compulsory Courses (60 credits).

Course#	Course Name	Units	Prerequisite
PHYS 343	SPECIAL RELATIVITY	3.0	PHYS 241
PHYS 392	SPECIAL TOPICS	3.0	DEPT. APPROVAL
PHYS 393	COMPUTATIONAL PHYSICS	3.0	PHYS 342+ PHYS 251
PHYS 412	LASER PHYSICS	3.0	PHYS 354+ PHYS 311
PHYS 413	ELECTRONICS CIRCUIT (2)	3.0	PHYS 354+ PHYS 312
PHYS 414	MICROWAVE (2)	3.0	PHYS 332+ PHYS 312
PHYS 455	QUANTUM MECHANICS (2)	3.0	PHYS 354
PHYS 462	RADIATION PHYSICS AND DETECTORS	3.0	PHYS 461
PHYS 463	NUCLEAR MODELS	3.0	PHYS 461
PHYS 472	SEMICONDUCTORS	3.0	PHYS 471+ PHYS 312
PHYS 493	PHYSICS EDUCATION TRAINING	3.0	DEPT. APPROVAL

Table 2.6: Major Requirements, Elective Courses (9 credits).

Course#	Course Name	Units	Prerequisite
MATH 204	DIFFERENTIAL EQUATIONS	3.0	MATH 202

Table 2.7: Major Requirements, Compulsory Course from Math. Dept. (3 credits).

2.10 Study Regulations and Tests

This is a trial version of the study regulations for the bachelor program in Physics issued by the Department of Physics at King Abdulaziz University.

- **Article 1**

  These regulations apply to the plan and courses of the bachelor's program in Physics in the Department of Physics at King Abdulaziz University based on the examination regulations and grading system for the bachelor's program of the Faculty of Science at King Abdulaziz University.

- **Article 2**

  The chairman secretariat, internal committees, and councils of the Department of Physics have administrative responsibility for operating the study regulation of the bachelor's program.

- **Article 3**

  The student is graded in the study plan, which is equivalent to at least eight (8) academic semesters for the university level.

- **Article 4**

  The Department and Accreditation committee receives portfolios for all courses in the bachelor's program. The instructor/professor must create portfolio materials throughout the semester, and multi-instructor courses must submit a one-course portfolio.

- **Article 5**

  The course portfolio is a collection of student work samples, usually compiled over time and rated using scoring rubrics, and it includes: Course syllabus or Course specifications, Teaching materials, Course assessment tools, Samples of student works, Student's final grade, Course assessment report or Course report, Student assessment of the course, and finally Faculty Vitae.

- **Article 6**

  Instructors who teach the Physics courses may be Professors (Full, Associate,

and Assistant), Lecturers, and Teaching assistants either with Ph.D. or M.Sc or B.Sc in Physics.

- **Article 7**

  The examinations are done at the end of each teaching semester of each academic year. The grade of a course is an integer number.

- **Article 8**

  The student must follow cell phones, food/drinks, and non-smoking regulations and rules in the CLASSROOM: The cell phone must be off or silent in any classroom/lab. The instructors and students are not allowed to eat or drink in the classroom/lab. Smoking is prohibited on the King Abdulaziz University campus.

- **Article 9**

  The minimum academic load of the student is 12 credit hours, and the maximum is 18 credit hours. However, the academic advisor should approve the maximum load of the student and after checking the student's GPA.

- **Article 10**

  Regular attendance is compulsory. Students are denied a course and banned from attending the final exam if they are absent for more than 25% of the total lectures and classes.

- **Article 11**

  Withdrawal from a course or the University requires the dean of the faculty in which the student is registered. Each faculty and department of the University set deadline dates for each semester concerning withdrawal.

- **Article 12**

  The Department Council or whomever it delegates may, in emergency cases, remove the deprivation and allow the student to enter the examination, provided they will give an acceptable excuse to the Department.

- **Article 13**

  The grade calculated of the absent student from the final examination shall

be zero in the exam. However, their grade in that course shall be counted according to the scores of the coursework they obtain.

- **Article 14**

  Suppose the student cannot attend the final examination in any semester course for an unavoidable reason. In that case, the College Council or whomever it delegates in very urgent cases could accept this excuse and permit them for a substitute examination to be conducted within a period not exceeding the end of the following semester. They shall be given the grade they obtain after sitting for the substitute exam.

- **Article 15**

  Disrespect for anyone or anything in the lab will not be tolerated. It is your responsibility to make this classroom a safe space for everyone in it, including yourself.

- **Article 16**

  In all discussions and group work, total respect for all people is required. All disagreements about work must stand and fall on reasoned arguments about physics principles, the data, or acceptable procedures, never based on power, loudness, or intimidation.

- **Article 17**

  It is understandable and expected that students would share information and ideas with classmates. The lab session is meant to be collaborative work, and students will come with different methods and approaches to resolving the problems. This exchange of ideas is encouraged. Since this class students have profoundly diverse backgrounds, students are inspired to help each other and learn. **Plagiarism** will not be tolerated. If a student copies somebody else's work, showing data that is not belonging to the student, adding student names to a problem the student did not solve himself. All of these cases are considered academic misconduct. Whether intentional or unintentional, Plagiarism has severe consequences and might reach expulsion from the department

and eventually from the University.

For further references, see Academic Regulations and Policies

2.11 Guidance and Counseling Services

The Department of Physics offers a range of Physics and Medical Physics research areas to explore and investigate. Nevertheless, deciding the route throughout the academic calendar to take advantage of these research interests. Therefore, the study plan has major requirements (9 credits) as guidance for elective courses to gain in-depth knowledge of different fields in Physics and Medical Physics to assist the student.

Please note that the guide considers the student has taken all compulsory courses in Physics or Medical Physics programs and that these notes are meant as an informal guide. Please contact **Physics@kau.edu.sa** for more guidance and counseling services.

Academic advising and counseling services is offered to prospective and declared Physics and Medical Physics majors, as well as first-year students who are choosing an introductory physics sequence at the beginning of each academic year. Students are divided into small groups then assigned academic advisers offer them academic advising and counseling. This involves knowing about class schedules, academic standing, and semester grade point average, besides helping non-level students select their course of study and planning their schedules.

2.12 Rights and Duties

Based on the university rights and regulations link, the department rights and regulations are summarised but not limited to:

2.12.1 Rights and Duties of Department Students

Student's Rights at Department of Physics

- The students' primary rights are to preserve their dignity and treat them respectably and fairly in the Physics department.
- An appropriate study environment allows students to achieve the educational objectives and gain the knowledge and Physics that satisfy their ambitions and aspirations.
- An appropriate study environment enables students to achieve the educational objectives and obtain the knowledge and Physics that satisfy their ambitions and aspirations.
- The student has the right to determine the specialization (Physics or Medical Physics) accommodating their qualifications according to GPA and positions available at the Department.
- The student must follow an accredited study plan outlining the courses' hours, levels, and description and the requirements necessary for graduation.
- According to regulations, the student has the right to defer studying for a legitimate reason accepted by the college council according to regulations, and suspension should not exceed two continuous semesters or three non-continuous semesters.
- The student should be notified of his failure in any course through the Department or the **Odus Plus** system.
- The student can add and withdraw from a course according to academic advising and counseling regulations.
- The student has the right to submit a request with justification to withdraw from a semester for a legitimately acceptable reason to the Department.
- The faculty members teach the student to adhere to the course syllabus or spe-

cifications when the study begins. This syllabus includes the course objectives, topics, and learning outcomes.

- The faculty member must attend the lectures and take tests as scheduled, go through the course theoretically and practically if possible, and announce their office hours and their office location.

Student's Duties at Department of Physics

- The student should respect the Department's rules, regulations, and decisions, including avoiding acting irregularly; otherwise, they will be exposed to the legal penalties that could have them dismissed entirely.
- The student should honorably represent their Department at the conferences, seminars, and internal or external participation.
- The student should respect all the Department's staff and its students and treat them respectfully.
- The student should respect the faculty members and asked for permission when they enter or leave the classroom or laboratory.
- The student should protect the Department's facilities, not damage them and not scribble on its walls, doors, and benches, and maintain the cleanliness of the classrooms and laboratories.
- The student should avoid cheating and copying or Plagiarism in homework, assignments, quizzes, and exams, and they should adhere to the rules regulating exams and tests.

For further information regrading Student's Rights and Duties at the KAU see University Student Regulations Rights and Responsibilities

2.12.2 Rights and Duties of Department Faculty members

- The Department's governance is focused intensely on agreement structure for developing academic programs and addressing issues and concerns the department face.

- To make a departmental decision/policy, the Department faculty members should suitably gather in departmental meetings. Decision-making/Policy-making by the Department will be conducted within the framework of policy established by the University. Individual Department faculty members acknowledged these responsibilities following the University's policy on professional ethics and academic responsibility.
- The head of the department distributes teaching assignments (loads) to faculty members each semester periodically to ensure that all instructional faculty members are participating appropriately and equitably in the teaching missions of the Department, College, and University. Each Department faculty member is responsible for responding promptly on matters related to the teaching assignments by the head.
- All faculty member is responsible for keeping up with Department research interests and engaging appropriately in the research goals of the Department, College, and University.
- Departmental affairs shall be administered regularly, e.g., daily or weekly or bi-weekly, department meetings throughout the academic year, and via emails and electronic documents year-round distributed to all relevant Department faculty members. In addition, specific meetings shall be assembled when deemed necessary. All meeting agendas and invitations will be sent electronically through **Physics@kau.edu.sa** to the Department faculty members' email addresses.

2.13 Complaints and Grievances

2.13.1 Grievances

Among student's rights is grievance allowing them to submit a complaint objecting to a decision issued against them and requesting their right to be upheld or to clear their name, academically or otherwise. The rules require that **Grievances** be directed to the appropriate concerned party in the event of failing to obtain their rights outlined in the regulations.

2.13.2 Complaints

Among student's responsibilities is obeying the rules for complaints. In addition, students are responsible for observing the chain of command in communicating complaints or requests starting with the course instructor, academic advisor, Department Head, College Administration, moving forward to concerned parties, and the University Administration.

For further references see University Student Regulations Rights and Responsibilities

Chapter 3

Policies for Students

In general, students in the Physics Department follow all policies that are applied at King Abdulaziz University, and it is the primary reference for all policies followed in the department.

3.1 Academic Integrity

The academic work you do at Physics@KAU requires you to obtain selections that reflect integrity and responsible behavior.

Infrequently, you may appear surprised by the amount of work you need to accomplish. For example, you may be short of time, working on several assignments due the same day, or preparing for exams or your project presentation.

Honesty is the framework of high-grade academic work. Whether you are working on a problem set, lab report, project or paper, avoid engaging in plagiarism or cheating. Follow this advice:

3.1.1 Plagiarism

- First of all, you have to believe in the power of your ability.
- It is unacceptable to acquire essays/articles or have someone write an essay/article for you.
- Conduct research genuinely, sincerely, and recognize/acknowledge others for their work.

- It is unacceptable to copy ideas, data, or exact wording without citing your source with some rephrasing.

3.1.2 Cheating

- Demonstrate your performance and accomplishments.
- It is unacceptable to copy answers from another student or ask another student to do your homework for you. Making up results is considered scientific misconduct.
- It is unacceptable to use a smartphone or other electronic devices during exams/tests or quizzes.
- Admit corrections and revisions from the instructor as part of the learning process.
- It is unacceptable to adjust graded exams and submit them for re-grading.
- Preferably, produce original, innovative and independent work for each class.
- It is unacceptable to submit projects or papers that have been done for a previous class.

3.2 Academic Misconduct

Academic misconduct is fabrication, falsification, or plagiarism in study activities or deliberate interference. If a student is involved in the investigation of an allegation of Academic Misconduct (whether as a Complainant, as a Respondent, or as a person from whom information about allegations is obtained), investigators must ask guidance from the Vice Dean for academic affairs of the Faculty of Science and the policy requirements that may apply.

Overall, any type of allegations of Academic Misconduct by students will be addressed in accordance with Student Guidebook page 7.

3.3 Academic Advising Guidelines

The advising process at KAU has a more general aim beyond our specific course choices and academic procedures/policies: to synthesize and contextualize students' educational experiences within the frameworks of their aspirations and abilities. As such, its goal is to support learning beyond campus boundaries and time frames. To this endeavor, KAU is keen to provide its students with effective academic and career advising, which starts from the beginning of their PY (preparatory year) at the university. The university organizes two student orientation weeks during this initial period: a fall orientation week and a spring orientation week. During the first orientation week, the students are introduced to different university services of the Deanship of Students Affairs, Deanship of Admission and Registration, central library, medical center, extracurricular activities, and so forth. Students are informed about applying and admission to the different university colleges after completion of their PY at the university during the second orientation week. KAU also has a central student advisory center, which organizes advising sessions regularly, leading people from different industry sectors and academia to present career guidelines. One other important aspect of this center is general counseling, which may involve personal counseling. Students are assigned to their advisors within the physics program, who provide them guidance pertaining to academic issues and careers. This includes, for example, advising about course choices, successfully acquiring degree requirements, academic policies/procedures, as well as broader concerns, such as career and graduate school opportunities according to their major. Beyond this, all faculty members have assigned office hours where students can seek additional individual assistance; these are displayed on their office doors. In addition, students can contact faculty using contact details such as email and office phone numbers listed in the ODUS-Plus system. The ODUS-Plus system can also be used to schedule official meetings within office hours. Students may also contact faculty outside these hours as needed.

Academic Advising is offered to prospective and declared Physics and Medical Physics majors, as well as first-year students who are choosing an introductory physics

sequence at the beginning of each academic year. Students are divided into small groups then assigned academic advisers offer them academic advising and counseling. This involves knowing about class schedules, academic standing, and semester grade point average, besides helping non-level students select their course of study and planning their schedules.

These guidelines intend to formulate a reasonable minimum level of expectations between students and their advisors in the Physics Department.

3.3.1 Guidelines for advisors

- Schedule a 15-minute meeting for Registration Day.
- Know the course requirements for the Physics degree.
- Know if your students are progressing well or not.
- Do not agree to a schedule you do not think your student can complete. Do not be shy about refusing to sign off on an unrealistic schedule.
- • Ask your student if there is anything going on that you should know about.
- If a student has trouble outside academics, work with them to find the right office to help them.
- Make sure you check up on your student two or three times during the term. Discuss with your students the best way to stay in contact.

3.3.2 Guidelines for students

- Show up for your meeting on time.
- Know the requirements for your degree. If you have questions, ask your advisor.
- Do not ask your advisor to sign off on a schedule you cannot complete. Be aware that he or she can refuse to do so. If that happens, understand their objection.

- Tell your advisor of anything going on in your life that could affect your academic performance. If you are not comfortable sharing the details, don't; but be sure to let your advisor know if you are having problems.
- If you are having problems, work with your advisor to find the right office to help you.
- Remember that advisors should not be expected to be available on a 24/7 basis, and cannot always help if you have left an issue until the last minute.

For more information, both advisors and students can visit the Academic Advising.

Chapter 4

Curriculum

4.1 Program Study Plan

Course#	Course Name	Units	Prerequisite
MATH 110	Calculus (1)	3.0	None
PHYS 110	General Physics (1)	3.0	None
ELI 101	English Language (1)	0.0	None
CPIT 100	Computer Skills	3.0	None
ELI 102	English Language (2)	2.0	None
		11	

Table 4.1: Level 1 (First Year/1st Semester).

Course#	Course Name	Units	Prerequisite
STAT 110	Statistics	3.0	None
CHEM 110	General Chemistry (1)	3.0	None
COMM 101	Communication Skills	3.0	None
BIO 110	Biology	3.0	None
ELI 103	English Language (3)	2.0	ELI 101
ELI 104	English Language (4)	2.0	ELI 102
		16	

Table 4.2: Level 2 (First Year/2nd Semester).

Course#	Course Name	Units	Prerequisite
PHYS 202	General Physics (2)	4.0	PHYS 110+MATH 110
PHYS 203	General Physics (3)	4.0	PHYS 110+MATH 110
MATH 202	Calculus (2)	3.0	MATH 110
PHYS 200	Lab Safety	1.0	None
PHYS 281	General Physics Lab (1)	1.0	PHYS 110
ARAB 101	Arabic language (1)	3.0	None
CHEM 200	Lab Safety	1.0	None
		17	

Table 4.3: Level 3 (Second Year/1st Semester).

Course#	Course Name	Units	Prerequisite
PHYS 221	Thermodynamics	3.0	PHYS 203+MATH 202
PHYS 241	Modern Physics (1)	3.0	PHYS 202+ MATH 202
PHYS 251	Mathematical Physics (1)	4.0	PHYS 202+MATH 202
PHYS 252	Classical Mechanics (1)	3.0	PHYS 110+MATH 202
CHEM 281	General Chemistry Lab (1)	1.0	CHEM 110
ISLS 101	Islamic Culture (1)	2.0	None
		16	

Table 4.4: Level 4 (Second Year/2nd Semester).

Course#	Course Name	Units	Prerequisite
PHYS 331	Electromagnetism (1)	3.0	PHYS 202+PHYS 251
PHYS 342	Modern Physics (2)	3.0	PHYS 241+PHYS 251+PHYS 252
PHYS 352	Mathematical Physics (2)	4.0	PHYS 251
PHYS 353	Classical Mechanics (2)	3.0	PHYS 252
PHYS 381	Modern Physics Lab	1.0	PHYS 241
MATH 204	Differential Equation (1)	3.0	MATH 202
		17	

Table 4.5: Level 5 (Third Year/1st Semester).

Course#	Course Name	Units	Prerequisite
PHYS 332	Electromagnetism (2)	3.0	PHYS 331
PHYS 354	Quantum Mechanics (1)	3.0	PHYS 342+PHYS 353
PHYS 311	Optics	3.0	PHYS 241
PHYS 312	Electronic circuit (1)	3.0	PHYS 331
PHYS 382	Electronics Lab	1.0	PHYS 331
PHYS 383	Optics Lab	1.0	PHYS 241
ISLS 201	Islamic Culture (2)	2.0	ISLS 101
PHYS 390	Training (1)	2.0	None (to be taken at Summer)
		18	

Table 4.6: Level 6 (Third Year/2nd Semester).

Course#	Course Name	Units	Prerequisite
PHYS 461	Nuclear Physics	3.0	PHYS 354
PHYS 484	Nuclear Physics Lab	1.0	PHYS 354
PHYS 471	Solid State Physics	3.0	PHYS 354
PHYS 485	Solid State Lab	1.0	PHYS 354
ARAB 201	Arabic language (2)	3.0	ARAB 101
ISLS 301	Islamic Culture (3)	2.0	ISLS 201
XXXX XXX	Elective from outside the department	3.0	XXXX XXX
		16	

Table 4.7: Level 7 (Fourth Year/1st Semester).

Course#	Course Name	Units	Prerequisite
PHYS 456	Statistical Mechanics	3.0	PHYS 221+PHYS 354
ISLS 401	Islamic Culture (4)	2.0	ISLS 301
XXXX XXX	Elective from outside the department	3.0	XXXX XXX
PHYS XXX	Elective from the department	3.0	XXXX XXX
PHYS XXX	Elective from the department	3.0	XXXX XXX
PHYS XXX	Elective from the department	3.0	XXXX XXX
		17	

Table 4.8: Level 8 (Fourth Year/2nd Semester).

4.2 Course Syllabi

PHYS 110: General Physics (1).

Course Description: This course covers physical quantities, dimensional analysis, vectors, motion in one dimension, motion in a plane, Newton's laws, friction, work and energy, linear momentum, impulse, the center of mass and collisions, rotational motion, Fluids, Oscillations, Waves, Sound waves, Temperature and Heat, Electric Charge, Electric Fields, Electric Current, Reflection and Refraction, and Images.

Prerequisite(s): None.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Serway, Raymond A., John W. Jewett, and Vahe Peroomian. "Physics for scientists and engineers: with modern physics." (2017).

PHYS 200: Safety Lab.

Course Description: This course introduces what to do when emergencies occur, including escape routes, emergency phone numbers, and location and use of emergency equipment (e.g., alarms, eyewashes, showers, fire extinguishers, spill kits). The course will broadly cover the major topics given below. The primary safety topics that the students in the physics labs should understand are:

1. Student responsibilities.
2. General safety precautions in the laboratories.
3. Working with electricity
4. What is dangerous about electricity?.
5. High voltage safety electronics equipment considerations.
6. Compressed gas cylinders.
7. General precautions when using lasers.
8. Radiation safety: x-radiation and nuclear radiation.
9. What to do if an injury incident occurs.
10. First aid.

Prerequisite(s): None.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Furr, A. Keith. CRC handbook of laboratory safety. CRC press, 2000.
2. Summers, John, Juliana Texley, and Terry Kwan. Science Safety in the Community College. NSTA Press, 2006.

PHYS 202: General Physics (2).

Course Description: In this course, students will study charge and electric force, electric field, Gauss' law, electric potential, capacitance, current and resistance, DC circuits, magnetic force, magnetic field, induction and inductance, the magnetism of matter, and Maxwell's equations.

Prerequisite(s): PHYS 110: General Physics (1), and MATH 110: Calculus (1) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 4.

Textbooks:

1. Walker, Jearl. Halliday Resnick fundamentals of physics. Hoboken, NJ: Wiley, 2014.

PHYS 203: General Physics (3).

Course Description: Students will study elasticity, fluid dynamics, wave propagation, sound, thermal conductivity, and optics in this course.

Prerequisite(s): PHYS 110: General Physics (1), and MATH 110: Calculus (1) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 4.

Textbooks:

1. Walker, Jearl. Halliday Resnick fundamentals of physics. Hoboken, NJ: Wiley, 2014.
2. Serway, Raymond A., John W. Jewett, and Vahe Peroomian. "Physics for scientists and engineers: with modern physics." (2017).

PHYS 221: Thermodynamics.

Course Description: In this course, students will study the laws of thermodynamics, Carnot's cycle, Entropy and equilibrium, Change of phase, Chemical potential and Maxwell's equations, Vapor pressure and Kinetic theory of gases, Principle of equipartition of energy, and specific heat of solids.

Prerequisite(s): PHYS 203: General Physics (3), and MATH 202: Calculus (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Rex, Andrew. Finn's Thermal Physics. CRC Press, 2017.
2. Kittel, Charles, and Herbert Kroemer. "Thermal physics." (1998): 164-167.

PHYS 241: Modern Physics (1).

Course Description: Students will study the special theory of relativity hypothesis in this course: Galilean's and Lorentz's transformation. In addition, relativistic dynamics, Photoelectric effect, Black body radiation, Compton effect, Photon, De Broglie's hypothesis, Uncertainty principle, Wave packet basics, Properties of atoms, Thomson's model, Rutherford's model, Bohr's model, Frank-Hertz' experiment, Correspond principle, Wilson-Sommerfeld's theory, Sommerfeld's relativistic theory. This course is intended to give the students a short comprehensive introduction to the special theory of relativity and the atomic theory of matter and charge.

Prerequisite(s): PHYS 202: General Physics (2), and MATH 202: Calculus (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Krane, Kenneth S., and Kenneth S. Krane. Modern physics. New York: Wiley, 1996.
2. Beiser, Arthur. Concepts of modern physics. Tata McGraw-Hill Education, 2003.
3. Taylor, J. R., C. D. Zafiratos, and M. A. Dubson. "Modern Physics for Scientists and Engineers (Mill Valley, CA." (2015).

PHYS 251: Mathematical Physics (1).

Course Description: In this course, students will study the Vector analysis, gradient, divergence, curl, Gauss' and Stokes' theorems, orthogonal curvilinear coordinates, elements of complex algebra, De Moivre's theorem, matrices, determinant, and their important algebraic properties. Ordinary differential equations of the first and second-order with constant and variable coefficients.

Prerequisite(s): PHYS 202: General Physics (2), and MATH 202: Calculus (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 4.

Textbooks:

1. Arfken, George B., and Hans J. Weber. "Mathematical methods for physicists." (1999): 165-169.
2. Rogel-Salazar, J. "Introduction to Mathematical Physics: Methods and Concepts, 2nd edn., by Chun Wa Wong: Scope: review. Level: undergraduate." (2013): 257-258.
3. Harper, Charlie. Introduction to mathematical physics. No. QC20 H37. 197.

PHYS 252: Classical Mechanics (1).

Course Description: In this course, students will study the Fundamental concepts of vectors, Newtonian mechanics, the rectilinear motion of a particle, the harmonic oscillator, general motion of a particle in three dimensions, non-inertial-reference systems, central forces, and celestial mechanics.

Prerequisite(s): PHYS 110: General Physics (1), and MATH 202: Calculus (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Fowles, Grant, and George Cassiday. "Analytical Mechanics." (2000): 390-393.

PHYS 281: General Physics Lab (1).

Course Description: The course is an introduction to the application of basic practical experiments of classical physics. Students will study friction, free fall, force table, Newton‘s law, projectile motion, air track, rotational motion, simple pendulum, Hook’s law in this course.

Prerequisite(s): None .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 311: Optics.

Course Description: In this course, students will study Wave motion, electromagnetic theory, superposition of waves, polarization, diffraction, interference, and coherence theory basics.

Prerequisite(s): PHYS 241: Modern Physics (1) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Hecht, Eugene. Optics, 5e. Pearson Education India, 2002.

PHYS 312: Electronic Circuits (1).

Course Description: In this course, students will study Electric current starting from Ohm's law and its applications in Electric circuits, including the study of current voltage A.C. D.C. sources. The laws of Kirchhoff and methods of solving D.C. circuits, Elements of A.C. circuits and their components (Capacitance inductors), Representing voltage currents through the concept of phasors, Methods to solve A.C. D.C. circuits using Thevenin and Norton methods, Diodes rectification of A.C. voltages, Smoothing circuits, power supplies, Transistors, biasing and circuit configurations and transistor with the small-signal model.

Prerequisite(s): PHYS 202: General Physics (2), and MATH 202: Calculus (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Theraja, B. L. Basic Electronics: Solid State. S. Chand Publishing, 2006.

PHYS 331: Electromagnetism (1).

Course Description: In this course, students will study Vector analysis, Electrostatics, work and energy, Special techniques in calculating potential (Laplace's equation, the method of images), Electromagnetic fields in mater (Polarization, electric displacement, linear dielectrics).

Prerequisite(s): PHYS 202: General Physics (2), and PHYS 251: Mathematical Physics (1) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Griffiths, David J. "Introduction to electrodynamics." (2005): 574-574.
2. Reitz, John R. "FrederickJ. Milford, Robert W. Christy. Foundations of Electromagnetic Theory." (1979): 172-174.

PHYS 332: Electromagnetism (2).

Course Description: In this course, students will study Static magnetism in the matter, Electromagnetic induction, Faraday's law, Maxwell's equations, Electromagnetic waves. Their propagation in conducting and non-conducting media, Dispersion, emission of electromagnetic radiations from dipoles, and point charges.

Prerequisite(s): PHYS 331: Electromagnetism (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Griffiths, David J. "Introduction to electrodynamics." (2005): 574-574.
2. Reitz, John R. "FrederickJ. Milford, Robert W. Christy. Foundations of Electromagnetic Theory." (1979): 172-174.
3. Neff, Herbert P. Basic electromagnetic fields. HarperCollins Publishers, 1987.

PHYS 342: Modern Physics (2).

Course Description: In this course, students will study the Schrödinger equation and its applications, the hydrogen atom in quantum physics, quantum numbers, angular momentum, intrinsic spin, energy levels and spectroscopy, Zeeman effect; fine structure, Pauli's exclusion principle, the periodic table, properties of elements, X-ray, optical spectra, the band theory in solids, electrons in metals, superconductivity, semiconductors. Nuclear structure and radioactivity.

Prerequisite(s): PHYS 241: Modern Physics (1), PHYS 251: Mathematical Physics (1), and PHYS 252: Classical Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Krane, Kenneth S., and Kenneth S. Krane. Modern physics. New York: Wiley, 1996.
2. Beiser, Arthur. Concepts of modern physics. Tata McGraw-Hill Education, 2003.
3. Taylor, J. R., C. D. Zafiratos, and M. A. Dubson. "Modern Physics for Scientists and Engineers (Mill Valley, CA." (2015).

PHYS 343: Special Relativity.

Course Description: Introduce the basic ideas and concepts of special relativity.

Prerequisite(s): PHYS 241: Modern Physics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Schwarz, Patricia M., and John H. Schwarz. Special relativity: from Einstein to strings. Cambridge University Press, 2004.
2. Taylor, Edwin F., Edwin F. Taylor, and John Archibald Wheeler. Spacetime physics. Macmillan, 1992.
3. Resnick, Robert. "Introduction to special relativity." (1968).
4. Kogut, John B. Introduction to Relativity: For Physicists and Astronomers. Academic Press, 2012.

PHYS 352: Mathematical Physics (2).

Course Description: Introduce the basic ideas and concepts of special relativity.

Prerequisite(s): PHYS 251: Mathematical Physics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 4.

Textbooks:

1. Arfken, George B., and Hans J. Weber. "Mathematical methods for physicists." (1999): 165-169.
2. Rogel-Salazar, J. "Introduction to Mathematical Physics: Methods and Concepts, 2nd edn., by Chun Wa Wong: Scope: review. Level: undergraduate." (2013): 257-258.
3. Harper, Charlie. Introduction to mathematical physics. No. QC20 H37. 197.

PHYS 353: Classical Mechanics (2).

Course Description: In this course, students will study the system of particles, angular momentum, lab, and center of mass coordinate systems. Mechanics of rigid bodies, the physical pendulum, laminar motion, collision of rigid bodies, motion of rigid bodies in three dimensions. Euler's equations, gyroscopic motion, the motion of a top, gyrocompass, inertia tensor, Lagrangian mechanics, generalized coordinates, Hamilton's variational principle, Hamiltonian equation, dynamics of oscillating systems, normal coordinates, coupled harmonic motion, continuous system, and the wave equation.

Prerequisite(s): PHYS 252: Classical Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Arya, Atam. "Introduction to Classical Mechanics." (2000): 390-393.
2. Marion, Jerry B. Classical dynamics of particles and systems. Academic Press, 2013.

PHYS 354: Quantum Mechanics (1).

Course Description: Topics covered include the basic ideas of the wave function, probability density. The operators in quantum mechanics. The Schrödinger equation and its applications in one, two, and three dimensions such as free particle. Step potential, barrier potentials, particle in a box, and the harmonic oscillator. Solution of the Schrödinger equation for the hydrogen-like atom. The concepts of orbital angular momentum and spin angular momentum. The spin-orbit interaction.

Prerequisite(s): PHYS 342: Modern Physics (2), and PHYS 353: Classical Mechanics (2).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Liboff, Richard L. Introductory quantum mechanics. Pearson Education India, 2003.
2. Zettili, Nouredine. "Quantum mechanics: concepts and applications." (2003): 93-93.

PHYS 354: Quantum Mechanics (1).

Course Description: Topics covered include the basic ideas of the wave function, probability density. The operators in quantum mechanics. The Schrödinger equation and its applications in one, two, and three dimensions such as free particle. Step potential, barrier potentials, particle in a box, and the harmonic oscillator. Solution of the Schrödinger equation for the hydrogen-like atom. The concepts of orbital angular momentum and spin angular momentum. The spin-orbit interaction.

Prerequisite(s): PHYS 342: Modern Physics (2), and PHYS 353: Classical Mechanics (2).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Liboff, "Richard L. Introductory quantum mechanics". Pearson Education India, 2003.
2. Zettili, Nouredine. "Quantum mechanics: concepts and applications." (2003): 93-93.

PHYS 381: Modern Physics Lab.

Course Description: In this course, students will apply modern physics experiments, including specific charge, Balmer series, electron diffraction, photoelectric effect, Frank-Hertz experiment, Rutherford scattering.

Prerequisite(s): PHYS 200: Safety Lab, and PHYS 241: Modern Physics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Krane, K. "Modern Physics 2 nd ed., pp. ix-xiv." (1995).
2. Taylor, John R., Chris D. Zafiratos, and Michael Andrew Dubson. Modern physics for scientists and engineers. 1991.
3. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 382: Electronic circuits lab.

Course Description: In this course, students will study Static magnetism, Electromagnetic induction, Faraday's law, Maxwell's equations, Electromagnetic waves. Their propagation in conducting and non-conducting media, Dispersion, emission of electromagnetic radiations from dipoles, and point charges.

Prerequisite(s): PHYS 202: General Physics (2), and PHYS 312: Electronic Circuit (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Alexander, Charles K., Matthew NO Sadiku, and Matthew Sadiku. Fundamentals of electric circuits. Vol. 4. New York: McGraw-Hill, 2009.
2. Theraja, B. L. Basic Electronics: Solid State. S. Chand Publishing, 2006.
3. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 383: Optics lab.

Course Description: Students will apply Newton's rings, Michelson's interferometer, single slit diffraction, double-slit interference, Malus' law, and refractive index in this laboratory.

Prerequisite(s): PHYS 311: Optics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Hecht, Eugene. Optics, 5e. Pearson Education India, 2002.
2. Guenther, Bob D. Modern optics. OUP Oxford, 2015.
3. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 392: Special Topics.

Course Description: The course aims to provide the students with special projects of their choice in physics. They individually arrange a talk on such topics at the end of the semester.

Prerequisite(s): Department approval.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks: Advanced topics in Physics selected from published research.

PHYS 412: Laser Physics.

Course Description: The course aims to provide the students with special projects of their choice in physics. They individually arrange a talk on such topics at the end of the semester.

Prerequisite(s): PHYS 354: Quantum Mechanics (1) and PHYS 311: Optics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Hitz, C. Breck, James J. Ewing, and Jeff Hecht. Introduction to laser technology. John Wiley Sons, 2012.
2. Sliney, David H., and J. Mellerio. Safety with lasers and other optical sources: a comprehensive handbook. Springer Science Business Media, 2013.
3. Wilson, John, and John FB Hawkes. "Optoelectronics-an introduction." Optoelectronics-An introduction (2nd edition (1989).

PHYS 456: Statistical Mechanics.

Course Description: Review of the thermodynamics laws, The Postulate of Classical Statistical Mechanics, Microcanonical Ensemble, Derivation of Thermodynamics, Equipartition Theorem, Classical Ideal Gas, Energy Fluctuations in the Canonical Ensemble, Grand Canonical Ensemble, Density Fluctuations in the Grand Canonical Ensemble, The Chemical Potential, The Postulates of Quantum Statistical Mechanics, Classical Limit of the Partition Function, Variational Principles, The Equation of State of an Ideal Fermi Gas, Bose-Einstein Condensation, An Imperfect Bose Gas.

Prerequisite(s): PHYS 221: Thermodynamics, and PHYS 354: Quantum Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Huang, Kerson. *Statistical Mechanics*. Wiley, 1987. ISBN: 9780471815181.
2. Kardar, Mehran. *Statistical Physics of Particles*. Cambridge University Press, 2007. ISBN 9780521873420.
3. Roy, Bimalendu N. Fundamentals of classical and statistical thermodynamics. John Wiley Sons, 2002.

PHYS 461: Nuclear Physics.

Course Description: In this course, students will study the general properties of the nucleus, nuclear stability, stability line, and the table of nuclei. Binding energy, separation energy. The liquid drop model. Nuclear decay law, half-life, mean lifetime, and radioactivity. Decay schemes. Production of radioactive materials. Radiation decay types. Nuclear structure models, nuclear reactions, and safety applications.

Prerequisite(s): PHYS 354: Quantum Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Dunlap, Richard A. An introduction to the physics of nuclei and particles. Thomson/Brooks-Cole, 2003.
2. Krane, Kenneth S., and David Halliday. Introductory nuclear physics. Vol. 465. New York: Wiley, 1988.

PHYS 471: Solid State Physics.

Course Description: The topics covered are crystal structure, crystal diffraction, crystal binding, lattice vibration, thermal properties, free electron theory, and energy bands.

Prerequisite(s): PHYS 354: Quantum Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Kittel, Charles, Paul McEuen, and Paul McEuen. Introduction to solid state physics. Vol. 8. New York: Wiley, 1996.

PHYS 484: Nuclear Physics lab.

Course Description: This course is intended to use the Geiger counter in measuring dead time, attenuation, inverse-square law, half-life in addition to gamma-ray spectroscopy using scintillation detectors.

Prerequisite(s): PHYS 200: Safety Lab, and PHYS 461: Nuclear Physics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Lab experiments manual in Nuclear Physics prepared by the department
2. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 485: Solid State Physics lab.

Course Description: The experiments and applications in this laboratory are described very closely, following the topics of PHYS 471.

Prerequisite(s): PHYS 200: Safety Lab, and PHYS 471: Solid State Physics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 1.

Textbooks:

1. Lab experiments manual in Solid State Physics prepared by the department
2. Tyler, Frank. A laboratory manual of physics. London: Edward Arnold, 1977.

PHYS 343: Special Relativity.

Course Description: Revision of the relativistic ideas discussed in PHYS 241. Physics before relativity and Newtonian relativity. Relativistic kinematics: Einstein's postulates of relativity and their consequences. The four-dimensional space and the space-time invariant interval. Relativistic Dynamics: Energy, momentum, and conservation of energy and momentum. Relativistic collisions and Compton effect. A gentle introduction to general relativity.

Prerequisite(s): PHYS 241: Modern Physics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Resnick, Robert. Introduction to Special Relativity. New York, NY: Wiley, 1968. ISBN: 9780471717256.

2. French, Anthony Philip. Special Relativity. New York, NY: Norton, 1968. ISBN: 9780393097931.

PHYS 393: Computational Physics.

Course Description: The course concentrates on using the latest programming languages, including statements, functions, loops, roots, integration, solving differential equations, matrices, set of simultaneous equations, and graphics, in addition to a very carefully selected set of problems in mathematical physics and numerical analysis requiring the application of programming languages in solving these problems.

Prerequisite(s): PHYS 251: Mathematical Physics (1), and PHYS 341: Modern Physics (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Vesely, Franz J. Computational Physics. New York: Plenum, 1994.

PHYS 412: Laser Physics.

Course Description: This course introduces Magnetic Resonance imaging from the basic concepts to cutting edge applications—fundamental physics of Magnetic Resonance, Resonance and detection, fundamentals of image formation, interpretation of images.

Prerequisite(s): PHYS 311: Optics, and PHYS 354: Quantum Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Shimoda, Koichi. Introduction to laser physics. Vol. 44. Springer, 2013.

PHYS 413: Electronic Circuit (2).

Course Description: The course introduces various types of modern transistors used in integrated circuits such as JFETs and MOSFETS. Applications of analog transistor circuits. Voltage amplifiers, Oscillators, Operational amplifiers. Digital circuits such as Logic gates and digital counters.

Prerequisite(s): PHYS 312: Electronic Circuit (1), and PHYS 352: Mathematical Physics (2) .

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Vesely, Franz J. Computational Physics. New York: Plenum, 1994.

PHYS 414: Microwave.

Course Description: Microwave Transmission. Basics, Concept of Mode: TEM, TE and TM Modes and their characteristic, Losses and concept and microwave impedance. Microwave Transmission Lines. Coaxial Line, Rectangular Waveguide, Circular waveguide, Stripline and Microstrip Line. Microwave Network Analysis and Measurements: Equivalent Voltages and currents for non-TEM lines, Network parameters and Scattering Parameters for microwave Circuits. Power, Frequency and impedance measurement, Network Analyser and measurement of scattering parameters. Microwave Devices. Active component: Diodes, transistors, oscillators and mixers. Passive component: Directional coupler, Power divider, Magic tree, attenuator and resonator. Low power microwave devices: Gun diodes. High power microwave devices: Travelling wave tubes (TWT), Magnetron and klystron. Microwave Systems and applications: Radar, Cellular Phone., Satellite Communication, Electromagnetic interference / Electromagnetic Compatibility (EMI / EMC) as modern application.

Prerequisite(s): PHYS 312: Electronic Circuit (1), and PHYS 332: Electromagnetism (2).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. David, M. Pozar, Microwave Engineering, Wiley India, (2012).

PHYS 455: Quantum Mechanics (2).

Course Description: Wave Mechanics, Spin One-half, Bras, Kets, and Operators, Linear Algebra: Vector Spaces and Operators, Dirac's Bra and Ket Notation, Uncertainty Principle and Compatible Observables, Quantum Dynamics, Two-Particle Problem , Angular Momentum, Eigenvalues of the Angular Momentum Operators, Addition of Angular Momentum, A Charged Particle in a Magnetic Field, Unitary and Similarity Transformations in Quantum Mechanics, Perturbation Theory, Scattering in Three Dimensions.

Prerequisite(s): PHYS 354: Quantum Mechanics (1).

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Liboff, Richard L. *Introductory Quantum Mechanics.* Addison Wesley, 2002. ISBN: 9780805387148.

2. Griffiths, David J. *Introduction to Quantum Mechanics.* 2nd ed. Pearson Prentice Hall, 2004. ISBN: 9780131118928.

PHYS 462: Radiation Physics and Detectors.

Course Description: The course covers radiation sources (standard sources and radiation machines), the interaction of radiation with matter, and the biological effects of radiation, counters and detectors (solid, liquid, gaseous), pulse processing and analysis, particle identification methods, nuclear energy, and safety applications.

Prerequisite(s): PHYS 461: Nuclear Physics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Hendee, William R. "Medical radiation physícs." (1970).

PHYS 463: Nuclear Models.

Course Description: The course covers nuclear two-body problems, nuclear force, Fermi gas model, nuclear shell model, the deformed shell model, the collective model, vibrational and rotational models.

Prerequisite(s): PHYS 461: Nuclear Physics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Greiner, Walter, and Joachim A. Maruhn. Nuclear models. Berlin: Springer-Verlag, 1996.

PHYS 472: Semiconductors.

Course Description: This course will be an introduction to the physics of semiconductors. It will cover the following topics: Band gaps in metals, semiconductors, and insulators, thermal excitation, photoexcitation, the Maxwell-Boltzmann distribution, intrinsic and extrinsic semiconductors, doped materials, compound semiconductors, charge carrier statistics and transport, luminescence, photoconductivity, p-n junctions, metal-semiconductor junctions, diodes, field-effect transistor (MOSFET), bipolar junction transistor (BJT), light-emitting diodes (LED), laser diodes (LD), photodiodes, and photovoltaic solar cells.

Prerequisite(s): PHYS 312: Electronic Circuit (1), and PHYS 471: Solid State Physics.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks:

1. Neamen, Donald A. *Semiconductor Physics And Devices: Basic Principles.* A McGraw-Hill; 4th edition, 2011. ISBN: 9780073529585.

2. Pierret, Robert F. *Semiconductor Device Fundamentals.* Addison Wesley; 2nd edition, 1996. ISBN: 9780201543933.

PHYS 493: Physics Education Training.

Course Description: The physics topics covered by the students are in different subjects suitable for middle and high schools and in general subjects. In addition, the students will receive some educational and scientific directions.

Prerequisite(s): Approval of the Department.

Note(s): A minimum grade of D is required in this course to progress to COURSE.

Credit Hours: 3.

Textbooks: To be arranged (TBA).

Chapter 5

Laboratories and Facilities

5.1 Research Equipment

5.1.1 Physical Vapor Deposition Lab

(at Building 115 Room 122):

- E-beam evaporation system NEE-400.
- Sputtering system: UNIVEX 350.

5.1.2 Chemical Vapor Deposition Lab

(at Building 115 Room 118):

- Plasma Enhanced Chemical Vapor Deposition System (PECVD): EasyTube@2000.
- Ultima IV X-ray diffractometer | Rigaku.

5.1.3 Laser Optics Lab

(at Building 115 Room 217):

- Tunable Dye Laser Pumped by pulsed Nd : YAG.
- He-Cd Laser - Kimmon Koha.
- kurt j. lesker Spherical vacuum chamber + HV-PUMP SYSTEM PT 300 DRY – DN 100 ISO-K.

- Ocean Optics LIBS 3000 spectrometer.
- SANYO's Biomedical Freezers.

5.1.4 Semiconductor devices Lab

(at Building 115 Room 215):

- PerkinElmer DSC 8500.
- TGA 4000 Thermogravimetric Analyzer.
- Heraeus VT 6060M Vacuum Oven.
- FO210CR Yamato FO Programmable Muffle Furnace.
- Autolab multichannel potentiostat/galvanostat.
- Sineo MDS-10.
- Keithley 4200-Semiconductor Characterization System.
- SCS Parameter Analyzer.

5.1.5 Material Science Lab

(at Building 115 Room 207):

- Inverted Metallurgical Microscope.
- Creep Machine.
- Mechanical Testing System Vickers Micro Hardness Tester.

5.1.6 Research Lab

(at Building 115 Room 211):

- Wisd Magnetic Stirrer MS-20A.
- Labtech LMS-1003 Hotplate Stirrer.
- Model 335 Cryogenic Temperature Controller - Lake Shore.

- 1260A | Frequency Response Analyzer.
- High Resolution Balance.
- JENWAY Model 3510 pH/mV/Temperature Meter.
- HiCube Eco | Pfeiffer Vacuum.
- Wessington Nitrogen Dewar.

5.1.7 Research Lab

(at Building 115 Room 202):

- Leybold didactic 554 800 X-ray apparatus.

5.1.8 Research Lab

(at Building 115 Room 125):

- Laboratory pellet press GS15011, GS25011.
- Ultrasonic cleaner (bath).
- Ken-A-Vision TU-19241C Comparison Scope 2 Binocular Microscope.
- Model 650 Low Speed Diamond Wheel Saw.
- WS-650-23 Spin Coater.
- Millipore Milli-Q Elix 3 Model ZLX56003Y.
- JSR Oven Model: JSON-100.

5.1.9 Nuclear Physics Lab

(at Building 115, Room 293, 292):

- Dactron: Voltage regulator.
- Lybold: NMR oscillator.
- HM407-2 Analogue digital oscilloscope.

- HM303-6 Analogue digital oscilloscope.
- Ortec 7150 Multichannel analyzer.
- Spectrum 88 Multichannel analyzer.
- AMETEK BA-016-025-1500 Si detector.
- Alpha spectrometer.
- Beta spectrometer.
- Ortec cc24 02-2 x-cooler II.
- Hall effect control.
- 2M212-x Bi corn corp tube.
- 2M212 Bi corn corp tube.
- Ortec 266 Pm base.
- Br-17-50-100 Si surface barrier detector.
- BA-19-300-1500 Si surface barrier detector.
- Ionization chambers.
- Ortec Germanium detector.
- Ortec NaI detector.
- Amersham Inc. 5 Ci Am-Be neutron source.

5.2 The Cleanroom Equipment

(at Building 115, Room 124): The cleanroom facility was established in 2010 for nanofabrication and to support research to forward stages and compete with other departments inside or outside the university. This cleanroom facility is in the old building 115 in Room No. 124, and it contains the following tools:

- Syskey technology Plasma Etch System.

- ELGA LABWATER PURELAB® OPTION-Q.
- SAWATEC LRD-250 Rins Dryer.
- SAWATEC Combi-SM200-HP200.
- EVG EVG610 SEMI-AUTOMATED MASK. ALIGNMENT SYSTEM.
- YES User-friendly plasma cleaning systems provide higher yields and repeatable results.
- VEECO VEECO DI INNOVA ATOMIC FORCE MICROSCOPE.
- OPTO/SYSTEM CO,LTD LD DIAMOND SCRIBEROSM-90TP.
- HYBOND MODEL 626.
- ZEISS GEMINI SCANNING ELECTRON MICROSCOPE.
- ZEISS GEMINI SCANNING ELECTRON MICROSCOPE.

5.3 Machine-shop

(at Building 115, Room 201): The Machine Shop was established in 2010 and has been active in research and undergraduate education inventions. The shop is administered by machining, soldering, computer coding, and woodworking. The shop is offering support in troubleshooting and resolving problematic situations for a particular instrument and some electronics. We stock many materials and old instruments and order any additional parts or tools required by the project. Services: • Machining. • Troubleshoot engineering. • Soldering (soft and silver). • Modification and repair. • Welding (MIG and TIG). • Sheet metal fabrication. • Plastic fabrication. • Woodworking. • Prototyping. • Electronics and computer work. • SolidWorks® 3D.

Here is the equipment available:

- Heavy Duty Bench Vise.
- COPKO Hand Operated Shearing Machine.

- SHINKO- 6" BENCH GRINDER GGM-250N.
- A.O.K 5 speed drill press.
- Vice Bench Clamp.
- 12 Speed Heavy Duty Drill Press.
- KADA Hot Air and Soldering Iron Rework Station - KADA 852.
- Hot Air Gun YAXUN 852D.

5.4 Computing and Software

(at Building 115, Room 209): The department has capable faculty members who contribute computing to support the inventive problem-solving for academic and research concerns. The fundamental computing necessities are followed by a given desktop PCs backed by massive disc storage and programming languages.

5.5 Physics Club

(at Building A90): It was recommended since 2018 to establish a student club to be as a community room and collaborative WorkSpace, and the university approved this recommendation, and a decision was issued to establish the club in the new building A90. This club is still under construction in terms of equipment and will be available for use from 2021, and then students gather to work together on lab assignments, homework assignments, and graduation projects. The club will include workstations with software for data acquisition and analysis (e.g., MATLAB and Mathematica).

5.6 Departmental Library

(at Building A90): The department's library was in the old building 115 on the second floor, Room 291, and when the department moved to the new building, it was decided to move the library to the new building. The library contains all textbooks and references related to the undergraduate physics program, and there

are books for contemporary interest, plus some issues of several physics' periodicals (e.g., American Journal of Physics, Physics Today, The Physics Teacher, etc.). It's a small library, but suitable and always available to all students and faculty in physics.

Chapter 6

Faculty members and Staff

6.1 Emeritus Professor

Table 6.1: Emeritus Professors in the Physics Department.

Name	Room, Building	Contact
Prof. Mohammed Ahmed Al-harbi	247, 115	x52714 | almomen@kau.edu.sa
Prof. Ahmed Bakri	240, 115	x64230 | abakry@kau.edu.sa
Prof. Farag Al-Hazmi	254, 115	x52416 | falhazmi@kau.edu.sa
Prof. Essam Alahdali	2027, A90	x |
Dr. Ali Mohammed Alsanoosi	257, 115	x64272 | asanoosi@kau.edu.sa
Dr. Jamal Madani	239, 115	x64229 | jhmadani@kau.edu.sa
Dr. Adel Faidah	256, 115	x64428 | afaidah@kau.edu.sa
Dr. Saeed Babkair	3027, A90	x64487 | sbabkair@kau.edu.sa
Dr. Saeed Alameer	249, 115	x64254 | sameer@kau.edu.sa
Dr. Mohammad Alahmadi	248, 115	x52283 | msahmadi@kau.edu.sa
Dr. Thoria A. Baeraky		x | Tbaerky@kau.edu.sa

6.2 Professor

Table 6.2: Professors in the Physics Department.

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6.3 Associate Professor

Table 6.3: Associate Professors in the Physics Department.

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6.4 Assistant Professor

Table 6.4: Assistant Professors in the Physics Department.

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6.5 Lecturer

Table 6.5: Lecturers in the Physics Department.

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6.6 Teaching assistant

Table 6.6: Teaching assistants in the Physics Department.

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6.7 Laboratory Technician

Table 6.7: Laboratory Technicians in the Physics Department.

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6.8 Administrator

Table 6.8: Administrators in the Physics Department.

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