College of science

Physics Department

BSc HANDBOOK

Content

1 Overview

Overview

Providing high-quality education in physics and its applications to make constructive contributions to serving society towards achieving sustainable development.

2 Mission and Objectives

Mission and Objectives

Mission

Providing high-quality education in physics and its applications to make constructive contributions to serving society towards achieving sustainable development.

Objectives

1. Participation in achieving national development objectives outlined in the Kingdom's Vision 2030.
2. Providing a motivating academic environment for education, learning, and research.
3. Developing graduates' skills for job market requirements and to achieve sustainable development.
4. Equipping students with a solid background in Physics concepts and for postgraduate studies.
5. Performing basic research for the development of the Kingdom according to Vision 2030.
6. Emphasizing the importance of Physics in knowledge and research for the development of society.

3 Admission and Graduation requirements

Admission and Graduation requirements

College of science
Physics Department

Admission and requirements

1- The applicant must be a Saudi national or a Saudi mother.
2- If the applicant is of a Saudi mother, he must send proof of that (the mother's national identity - a copy of the birth certificate - family card) to the following email Reg@kku.edu.sa
3- Obtaining a national identity.
4- The applicant must not have been dismissed academically or disciplinary from the university or from any other Saudi university.
5- No more than five years have passed since the date of obtaining the general secondary certificate, bearing in mind that priority for admission is given to graduates of the most recent year.

Graduation requirements

1- The student graduates after successfully completing all subjects of the study plan, provided that his cumulative GPA is not less than (2-5).
2- In the event that his GPA is lower, the College Council may based on the recommendation of the relevant department council, specify suitable courses for the student to study to raise his cumulative GPA.

4 Program Learning Outcomes

Program Learning Outcomes

College of science
Physics Department

KNOWLEDGE

1. Define core scientific knowledge, facts, and concepts in Physics and related fields.
2. Outline a wide range of knowledge and in-depth understanding of the concepts and theories of Physics.
3. Describe Physics in real applications and related innovations.
4. State-selected experimental and theoretical Physics techniques along with scientific validation methods.

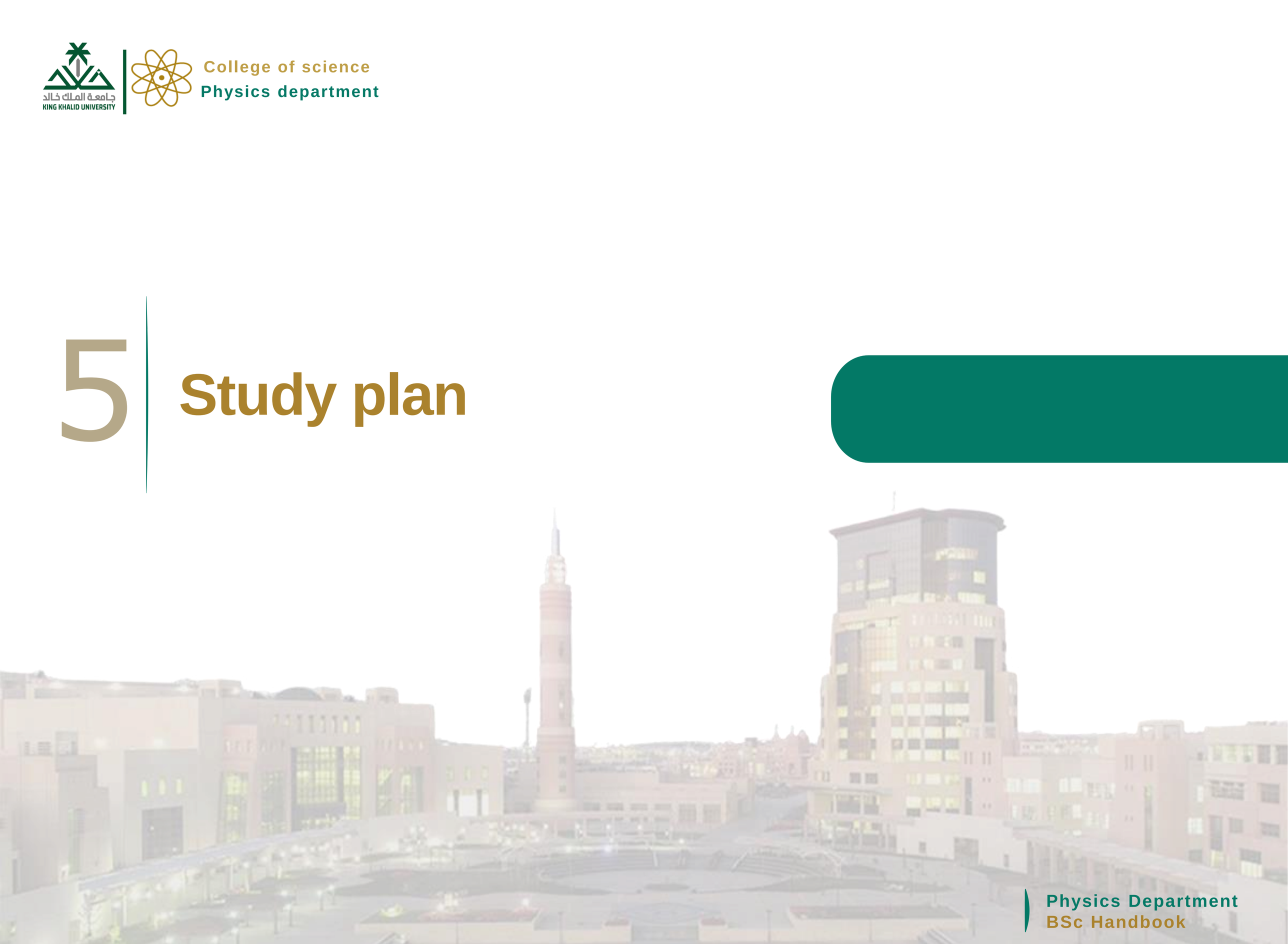
SKILLS

1. Use different concepts and theories of Physics to solve Physics related problems.
2. Analyze, assess, and interpret scientific data by applying appropriate mathematical and practical skills in Physics.
3. Use digital technologies efficiently.
4. Demonstrate independence and teamwork skills besides leadership abilities.
5. Develop the ability to self-learning and acquire skills in e-learning, as well as effective communication skills.

VALUES

1. Adhere to ethical scientific values and strive for excellence in professional practices.
2. Participate in national strategies, addressing community issues, and volunteering work.
3. Take the initiative and observe responsibility for assignments.
4. Accept constructive criticism and self-evaluation, and show personal characteristics and capabilities.

5 Study plan



Study Plan

King Khalid University
Science College
Physics Department

جامعة الملك خالد
كلية العلوم
قسم الفيزياء

Study plan of the Bachelor of science in Physics program
(Number of program hours = 126)

First year

First Level

Code	Course Name	Hr	Requisite
011ENG-6	Intensive English Program 1	6	-
101PHYS-4	Introduction to Physics	4	-
101CHEM-4	General Chemistry -1	4	-
111IC1-2	The Entrance to the Islamic Culture	2	-
Total		16	

Second Level 2

Code	Course Name	Hr	Requisite
101CMS-3	Computer Science	3	-
101BIOL-4	General Biology	4	-
101MATH-3	Calculus - 1	3	-
110NGL-3	Scientific English for Science Students	3	011ENG-6 - S
112IC1-2	Islamic Culture -2	2	-
201ARAB-2	Arabic Language Skills	2	-
Total		17	

Second year

Third Level

Code	Course Name	Hr	Requisite
102CMS-2	Computation Skills 2	2	101CMS-3 - S
113IC1-2	Islamic Culture -3	2	-
202MATH-3	Calculus 2	3	101MATH-3 -S
202ARAB-2	Arabic Editing	2	-
211PHYS-3	Mechanics 1	3	101PHYS-4 -S
220PHYS-3	Electricity And Magnetism 1	2	101PHYS-4 -S
241PHYS-3	Heat And Thermodynamics	3	101PHYS-4 -S
Total		17	

Fourth Level

Code	Course Name	Hr	Requisite
114IC1-2	Islamic Culture -4	2	-
213PHYS-3	Mechanics 2	3	211PHYS-3 -S
223PHYS-2	Experimental Electricity And Magnetism	2	-
224PHYS-2	Electricity And Magnetism 2	2	220PHYS-2 -S
232PHYS-2	Waves/Oscillations And Sound 1	2	-
242PHYS-1	Experimental Heat And Mechanics	1	-
251PHYS-3	Mathematical Physics 1	3	101MATH-3 -S
Total		15	

Third year

Fifth Level

Code	Course Name	Hr	Requisite
203MATH-3	Calculus 3	3	202MATH-3 -S
330PHYS-3	Light And Optics	3	101PHYS-4 -S
333PHYS-2	Waves/Oscillation And Sound 2	2	232PHYS-2 -S
334PHYS-2	Experimental Waves And Optics	2	-
352PHYS-3	Mathematical Physics 2	3	251PHYS-3 -S
353PHYS-3	Modern Physics	3	-
Total		15	

Sixth Level

Code	Course Name	Hr	Requisite
300CS-3	Computer Programming for Physics	3	-
324PHYS-3	Electronics	3	220PHYS-2 -S
325PHYS-2	Experimental Electronics	2	-
326PHYS-3	Electromagnetic Theory 1	3	224PHYS-2 -S
343PHYS-3	Statistical Physics	3	353PHYS-3 -S
354PHYS-3	Quantum Mechanics 1	3	-
Total		16	

Fourth year

Seventh Level

Code	Course Name	Hr	Requisite
427PHYS-3	Electromagnetic Theory 3	3	326PHYS-2 -S
455PHYS-3	Experimental Modern And Atomic Physics	3	353PHYS-3 -S
461PHYS-3	Atomic Physics And Spectra	3	353PHYS-3 -S
471PHYS-3	Solid State Physics I	3	-
481PHYS-3	Nuclear Physics I	3	-
492PHYS-3	Research Project	3	-
Total		16	

Eighth Level

Code	Course Name	Hr	Requisite
456PHYS-2	Quantum Mechanics 2	2	354PHYS-3 -S
463PHYS-2	Light And Lasers	2	326PHYS-2 -S
472PHYS-2	Solid State Physics 2	2	471PHYS-3 -S
473PHYS-2	Experimental Solid State Physics	2	471PHYS-3 -S
482PHYS-2	Nuclear Physics 2	2	481PHYS-3 -S
483PHYS-2	Experimental Nuclear Physics	2	481PHYS-3 -S
491PHYS-2	Special Topics	2	-
Total		14	

Study Plan

Old Plan

Developped Plan

Program specification

6 Course description

Course Description

College of science
Physics Department

Introduction to Physical Science

101 PHYS-4

1. COURSE DESCRIPTION

The course includes the basic concepts of physics as units, dimensions, vectors, Newtonian mechanics, fluid properties and fluids, principles of heat, static electricity, sound and light. It also includes a number of practical experiments covering all the basic concepts of physics.

2. COURSE MAIN OBJECTIVE

The main purpose of this course is to:

- *Introduce the basic concepts in physics such as unites and dimensions, vectors, principles of mechanics and motion in one dimension, Work, Power and energy, fluids mechanics, Elasticity, heat and properties of matters, ….*
- *Understand and analysis experimental results.*
- *Building relationships between physical phenomena and life, working in group, communicate with other persons; do research in a specific field. How to describe a physical phenomenon by mathematical equation*
- *Acquire the skills of drawing, analysis, and interpretation through performing a number of physical experiments in the laboratory.*

Required Textbooks	*Hugh D. Young, Roger A. Freedman, University Physics with Modern Physics, 14th Edition, (2016),*
Essential References Materials	*Raymond A. Serway, Physics for Scientists and Engineers, 9th Edition, (2004), Thomson Brooks. Pearson Education. ISBN 13: 9780321982582*

Course Description

College of science
Physics Department

Classical Mechanics1

211 PHYS-3

1. COURSE DESCRIPTION

The standard undergraduate program in physics of the King Khalid University includes courses on Classical Mechanics1. To provide study material on such a topic is obviously a difficult task partly because of the huge amount of material and partly because of the different nature of concepts used in these branches of physics.

The scope of the present course may be gauged from the contents. Each chapter consists of a succinct presentation of the physical principles, followed by a large number of completely solved problems which are a valuable learning tool and naturally develop the subject and illustrate these principles. The solved problems have been made short and have been ordered in terms of difficulty. This course consists of six chapters:

1. *Dimensions, and units of physical quantities.*
2. *Vectors, speed, velocity and acceleration.*
3. *Free fall, motion in a vertical plane, Newton's laws of motion.*
4. *2D motion, projectiles and circular motion.*
5. *Energy, work and Energy conservation principle.*

2. COURSE MAIN OBJECTIVE

The main purpose of this course is to present the material in the most elementary and digestible form and also to provide study material on diverse topics of the Classical Mechanics1which are characterized by different nature of concepts used in these branches of physics. The students will be able to demonstrate their understanding of the foundations in this domain (mathematical foundations applied for general physics) by demonstrating competence in the major through appropriate homework assignments and examinations, particularly in their upper-level physics courses. Encouraging the student to increase the lecture attendance and to wake up his scientific curiosity towards the subjects of Classical Mechanics1 is also the objective of this course. In addition to, 1) learn and understand the basic principles of kinesiology on a straight line, in a plane, and in a field Central power, 2) Developing skill in solving applied problems and knowing the mathematical methods used, and 3) Building a solid foundation in the fundamentals of physics for students to be able to comprehend most evolving concepts.

Required Textbooks	*Daniel Kleppner, Robert J Kolenkow, Introduction to Mechanics 2nd Edition (2010), Cambridge University Press, ISBN 13: 9780521198219* *Grant R. Fowles, George L. Cassiday , Analytic Mechanics, 7th Edition, (2004), homson Learning / Brooks/Cole. ISBN 10: 0534494927*
Essential References Materials	*Antonio Fasano, S Marmi, Beatrice Pelloni, Analytical mechanics: an introduction, (2006), Oxford University Press, USA. SBN 13:* *9780191513596* *Raymond A. Serway, John W. Jewett , Physics for Scientists and Engineers with Modern Physics , 9th edition (2014), Cengage Learning.*

Course Description

College of science
Physics Department

Electricity and Magnetism 1

220 PHYS-2

1. COURSE DESCRIPTION

This course includes the basic principles of electricity and magnetism, and it is concerned with static and dynamic electricity, electric and magnetic fields, as well as electricity, voltage, and electric energy. It contains an item on capacitors, their types, applications, electrical circuits, and their laws, as well as magnetic flux and movement of charged bodies in the magnetic field and their applications, as well as on the magnetic properties of materials.

2. COURSE MAIN OBJECTIVE

The objectives of this course are to teach the undergraduate students the different fundamental laws of electrostatics and magnetism. After completion of this course, students will have the knowledge of following;
Coulomb's law and Applications, The lines of Forces, The concepts of the field, Electric Field, The Flux, Gauss's Law and Applications, Electrostatic Potential and Applications. In addition to,
1- Learn and understand the basic principles of the branch of electricity and magnetism, their laws, and their scientific and technical applications.
2- Developing abilities to solve mathematical problems.
3- Learn about some of the applications of this branch of physics in daily life and how to deal with them

Required Textbooks	*Purcell E.M., Morin D.J., Electricity and Magnetism, 3ed Edition (2013), Cambridge University Press. ISBN 13:78-1-107-01402-2*
Essential References Materials	*Kyle. Kirkland, Electricity and magnetism, 1st edition, (2007), Publisher: Facts on File. ISBN 13: 9780816061129*

Course Description

College of science
Physics Department

Heat and Thermodynamics

241 PHYS-3

1. COURSE DESCRIPTION

Heat and Thermodynamics course includes topics on Heat, kinetic theory of gases, equation of state, thermodynamics system reversible and irreversible processes, first and second laws of thermodynamics and its applications in Heat Engine and Heat Pump, Entropy of a pure substance and its change in reversible and irreversible processes. To provide study material on such diverse topics is obviously a difficult task partly because of the huge amount of material and partly because of the different nature of concepts used in these branches of physics.

The scope of the present course may be gauged from the Contents. Each chapter consists of a succinct presentation of the physical principles, followed by a large number of completely solved problems which are a valuable learning tool and naturally develop the subject and illustrate these principles. The solved problems have been made short and have been ordered in terms of difficulty.

2. COURSE MAIN OBJECTIVE

The main purpose of this course is to study diverse topics of heat and thermodynamics which are characterized by different nature of concepts used in the branches of physics. The students will be able to demonstrate their understanding of the foundations and principles in thermodynamics by demonstrating competence in the major through appropriate homework assignments and examinations. Encouraging the student to increase the lecture attendance and to wake up his scientific curiosity towards the subjects of thermodynamics is also the objective of this course.

In addition to the following two goals:

1- Learn and understand the basic principles of the branch of heat, thermal estimates, and the laws of thermodynamics

And its scientific and technical laws and applications.

1- Identifying the scientific innovations in this field and developing capacities for application and innovation.

REQUIRED TEXTBOOKS	*Fundamentals of Thermodynamics , Richard E. Sonntag, Claus Borgnakke, Gordon J. Van Wylen, 2002 John Wiley & Sons*
ESSENTIAL REFERENCES MATERIALS	*- Lectures on Heat and Thermodynamics Physics 152 Michael Fowler, University of Virginia 08/30/08.* *- Thermodynaics. Yunus A Cengel and Michael A. Booles 9third Edition ISBN: 0-534-49341-6.* *- Physics for Scientists and Engineers with Modern Physics, Ninth Edition, Raymond A. Serway, Boston, MA 02210 USA, 2016..*

Course Description

College of science
Physics Department

Mechanics II

213 PHYS-3

1. COURSE DESCRIPTION

This course is interested in the topic of mechanics II such as lows of conservation, linear and angular momentums, the center of mass, static equilibrium, Lagrange and Hamiltonian mechanics. .

2. COURSE MAIN OBJECTIVE

The objectives of this course are to teach the students fundamentals of Mechanics II in physical sciences. After completion of this course, students will have the knowledge and skills in the following topics:

- *laws of conservation (energy, linear momentum, and angular momentum).*
- *Dynamics of rigid bodies (Rotation and translation).*
- *Center of mass, the motion of the rigid body,*
- *Lagrange's equations, and Hamilton's equations*

Required Textbooks	- *Physics principals with applications , Douglas C. Giancoli, 2005, Plarson education, USA.* - *Analytical mechanics; Fowles and Cassiday, Thomson Learning, Inc. 5th edition.*
Essential References Materials	- *Physics for Scientists and Engineers, Raymond A. Serway, Thomson Brooks, 2004; 9th Edition.*

Course Description

College of science
Physics Department

Practical Electricity and Magnetism

223 PHYS-2

1. COURSE DESCRIPTION

This course presents an overview of physical measurement techniques, scientific data analysis and error calculations, and a general revision of how to write scientific reports. Also, it focuses on conducting and interpreting a number of experiments in the Electricity and Magnetism field.
This course is considered a supportive course for two courses; 220 phys. and 224phys.

2. COURSE MAIN OBJECTIVE

This course aims to achieve a number of objectives
1- Training the student to do a number of experiments in the electricity and magnetism field.
2- apply many physical laws in the field of electricity and magnetism.
3- Developing the student's skills in carrying experiments in the laboratory and improving their skills and their knowledge to use types of equipment and devices.
4- Confirming the theoretical concepts that the student learned in the course of 220 Phys and 224 Phys, and verifying some of them experimentally.
55- Developing the student's skills to analyze and discuss results and write scientific reports.

Required Textbooks	*Electricity and Magnetism Manual Experiments – Prepare of Department of Physics -faculty of science –KKU.*
Essential References Materials	*Raymond A. Serway, John W. Jewett , Physics for Scientists and Engineers with Modern Physics , 9th edition (2014), Cengage Learning.*

Course Description

College of science
Physics Department

Waves &Vibrations

232 PHYS-2

1. COURSE DESCRIPTION

This course is concerned with vibrations and waves as one of the basic branches of physics. Vibrations and Waves course is dealing with free vibrations, forced vibrations, and resonance, leading into normal modes of discrete and continuous systems. Wave propagation is covered for several different types of waves, including electromagnetic waves based on the wave equation and wave aspects of matter.

2. COURSE MAIN OBJECTIVE

After completing this course, the student should be able to know, understand, and use the mathematical concepts and laws related to topics of vibrations and waves such as oscillatory Motion, Damped Oscillations, Forced Oscillations, Wave Motion, Superposition of Sinusoidal Waves.
On the other hand, the student will be
1. familiar with types of oscillations.
2. intimate with the wave equation and its uses.
3. understand combinations of waves.

Required Textbooks	*A. P. French, Vibrations and Waves, 1st edition, (2001), CRC Press. ISBN 13: 9780748744473*
Essential References Materials	*H. J. Pain, The Physics of Vibrations and Waves, 6th Edition (2005), Wiley. ISBN 13: 047001296X*

Course Description

College of science
Physics Department

Electricity and Magnetism-2

224 PHYS-2

1. COURSE DESCRIPTION

This course included the electrical and magnetic concepts that were not covered in the course, 220 Phys. it is. It is concerned with electromagnetic induction, Faraday's law, its applications, inductances, inductance, and methods of calculating it in various circuits, the energy stored in the magnetic field is then transferred to alternating current and its circuits, ability, and applications.

2. COURSE MAIN OBJECTIVE

The main target of this course learns some concepts to understand the relationship between electricity and magnetism, by study sources of the magnetic field, the Biot-Savart law, the magnetic force Between two parallel conductors, Ampere's law, the magnetic field of a solenoid, magnetic flux, Gauss's law in magnetism.
An addition to;
1- Learn the concepts of electromagnetic induction, coils and alternating current circuits, their applications and how to deal with them scientifically
2- Learn about practical innovations in this field and how to benefit from them in practical life.
3- Development of students' own abilities in the field of electrical applications

Required Textbooks	*Purcell E.M., Morin D.J., Electricity and Magnetism, 3ed Edition (2013), Cambridge University Press. ISBN 13:78-1-107-01402-2*
Essential References Materials	*Kyle, Ph.d. Kirkland, Electricity and magnetism, 1st edition, (2007), Publisher: Facts on File. ISBN 13: 9780816061129*

Course Description

College of science
Physics Department

Practical heat and mechanics

242 PHYS-1

1. COURSE DESCRIPTION

This course presents an overview of physical measurements techniques, scientific data analysis and error calculations and a general revision of how to write scientific reports. Also, it focuses on Practical experiments on hydromechanics and thermodynamics, including the compound pendulum - extrusion - Moment of inertia of various shapes and objects - the motion of a ball on a parabolic path - expansion -Thermal - gas thermometer and platinum thermometer - thermoelectric phenomenon - radiation law-Thermal - coefficients of thermal conductivity for well-conducting and poor-conducting objects - heat-The specificity of fluids and the law of refrigeration - the ratio between the two specific temperatures of the air.

2. COURSE MAIN OBJECTIVE

The purposes of this course are

1. Learn about the experiments of applied physics in the field of heat and mechanics.

2- Developing the student's ability to conduct laboratory experiments on his own and developing his efficiency in dealing with devices.

3- Correctly applying the laws of thermodynamics to obtain the results of conformity.

4- Developing students' ability and skills to discover and analyze phenomena in thermodynamics, practice physical measurement techniques, analyze scientific data, and write their own reports.

Required Textbooks	*Heat and mechanics laboratory experiments Notes – Prepare of Department of Physics -faculty of science –KKU.*
Essential References Materials	*Fundamentals of Thermodynamics, Richard E. Sonntag, Claus Borgnakke, Gordon J. Van Wylen, 2002 John Wiley & Sons*

Course Description

College of science
Physics Department

Mathematical Physics-1

251 PHYS-2

1. COURSE DESCRIPTION

This course covers mathematical concepts and methods used in the various branches of physics such as complex numbers, their mathematical operations, matrices, and systems of first-order linear equations and instantaneous series and ordinary differential equations, and equivalent coordinate systems.

2. COURSE MAIN OBJECTIVE

The purpose of this course is to teach the students fundamentals of mathematical methods in physical sciences. After completion of this course, students will have the knowledge of following;
Identify the important mathematical methods that any specialist in science needs.
That the student understands the methods of the mathematical treatment of physical problems and becomes able to use and apply them

Required Textbooks	*Mathematical methods for physical sciences, Boas (Wiley) 3rd edition (2005).*
Essential References Materials	*Mathematical methods for physics and engineering, K. F. Riley, M. P. Hobson, and S. J. Bence (CUP) 3rd edition (2006).*

Course Description

College of science
Physics Department

Light and Optics

330 PHYS-3

1. COURSE DESCRIPTION

This course is interested in the topic of light and optics, which contains basic concepts, theories, and phenomena in light and its applications. This course includes the nature of light (particle and wave) - the phenomena of reflection and refraction - prism - mirrors - lenses - optical instruments - the phenomena of interference, diffraction, and polarization. In addition to, optical applications such as images and various optical devices and their uses

2. COURSE MAIN OBJECTIVE

The main purpose of this course is to:

1- That the student knows the nature and propagation of light, measure its speed, understand its various phenomena, and delve into the science of optics and optical devices.

2- It will understand the areas of use, how to benefit from them, and simulation.

3- That the student becomes able to solve the problems applied to the visual phenomena and explain the reasons for their occurrenc

Required Textbooks	*Fundamental of optics; Francis A. Jenkins and Harevey E. White; fourth edition, McGraw-Hill Primis Custom Publishing.*
Essential References Materials	*Raymond A. Serway, Physics for Scientists and Engineers, 9th Edition, (2004), Thomson Brooks.* *Introduction to Optics, by Frank J. Pedrotti, Leno M, Leno S. Pedrotti, 3rd ed. 2006, Publisher: Benjamin Cummings.*

Course Description

College of science
Physics Department

Vibrations and Waves II

333 PHYS-2

1. COURSE DESCRIPTION

This course is considered to be complementary to the phenomena and applications not included in the Course of 232 Phys. This course interests in potential concepts in vibrational and waves physics where includes the following topics;

- *Physical characteristics of waves, Travelling sinusoidal waves, The wave equation, The energy in a wave*
- *Standing Waves on a String: Standing Waves as the Superposition of Two Travelling Waves,*
  Nodes and Anti-Nodes, Times required to form Nodes, and Anti-Nodes
- *The Nature of Sound Waves, Resonant Standing Sound Waves, Sound level and sound intensity, Velocity of longitudinal waves in a fluid.*
- *Doppler Effect and related Phenomena ,Shock Waves*
- *Dispersion of Waves, The Superposition of Waves in Non-Dispersive Media, Beats*

2. COURSE MAIN OBJECTIVE

The main objective of this course is for the student to complete his educational attainment in the field of waves and vibrations and to be familiar with some important applications in the field of sound and hearing, depth estimation, information transmission and medical applications.

Required Textbooks	*1-Physics for Scientists and Engineers, Raymond A. Serway, Thomson Brooks, 2004; 9th Edition.* *2- H. J. Pain, The Physics of Vibrations and Waves, John Wiely & Sons,Ltd (2005).*
Essential References Materials	*H. J. Pain, The Physics of Vibrations and Waves, John Wiely & Sons,Ltd (2005).* *2- H. D. Young and R. A. Freedman, University Physics, 9th edition, Addison-Wesley, Reading, MA (1996)*

Course Description

College of science
Physics Department

Practical Light and Waves

334 PHYS-2

1. COURSE DESCRIPTION

This course is considered practical and applied to the courses Phys 330 & Phys 232 in which the student is taking a number of experiments that cover wave, and optical phenomena.

2. COURSE MAIN OBJECTIVE

The student is trained to do a number of experiments on Light and Waves physics- study many important physical phenomena and develop his knowledge and technical skill in the laboratory- In completing the course, the student becomes capable of applying all theoretical concepts and practical procedures included in the course which can be summarized in the next points:

1- Knowing of the experimental apparatus, performing experiments, and developments of Practical skills on wave and optics.

2- Observation and analysis of experimental phenomena and writing reports about them.

3- Developments of student skills on performing experiments in the laboratory and improving His skills and knowledge to use experimental set-up and equipment.

4- Confirmation of the theoretical concepts learned in courses of optics and wave and verifying them experimentally.

5- Application of physical concepts and driving them by fine measurement and plotting the obtained results in graphs.

Required Textbooks	*Wave and optics laboratory experiments Manual – Prepare of Department of Physics -faculty of science –KKU.*
Essential References Materials	*Francis Jenkins , Harvey White, Fundamentals of Optics, 4th Edition, Mortuus Books , ISBN-13: 978-0072561913*

Course Description

College of science
Physics Department

Mathematical Physics II

351 PHYS-2

1. COURSE DESCRIPTION

This course complements the Mathematical Physics 1 course, as this course is concerned with mathematical concepts and methods that are used in dealing with advanced physical issues such as solving differential equations using series and special functions (such as Gender - Hermite - Gamma) as well as partial differential equations and complex functions

2. COURSE MAIN OBJECTIVE

This course aims to develop students' mathematical abilities in preparation for their use in advanced physics and practical research branches.

Required Textbooks	*Mathematical Methods in the Physical Sciences; Mary L. Boas; Publisher: Wiley International Edition ISBN-0-471-19826-0*
Essential References Materials	*Fundamentals of Mathematical Physics (Dover Books on Physics) Edgar A. Kraut ISBN: 0486458091* *Publisher: Dover Publication (Reprint of the McGraw-Hill, Inc., New York, 1967 edition)* *Mathematical Methods for the Physical Sciences: An Informal Treatment for Students of Physics and EngineeringK. F. Riley ISBN: 0 521 20390 2 Cambridge University Press*

Course Description

College of science
Physics Department

Modern Physics

353 PHYS-3

1. COURSE DESCRIPTION

The modern physics course presents the two fundamental theories (relativity and quantum mechanics) introduced at the beginning of the 20th century and considered as the foundations of all parts of modern physics. Then the course gives a short overview of the most important recent fields of modern physics. This course represents a gateway to the more advanced courses in the Bachelor of Physics and it contains three main parts: the theory of relativity, the birth of quantum mechanics (fundamental experiments and principles), and an overview of various parts of modern physics mainly (atomic, nuclear & elementary particles, condensed matter, astrophysics). The scope of the present course may be gauged from the Contents. Each course is a chapter followed by a large number of completely solved problems which are a valuable learning tool and naturally develop the subject and illustrate different applications. The solved problems have been made short and were ordered in terms of difficulty.

2. COURSE MAIN OBJECTIVE

The modern physics course aims to:

1- Building the physical basis of mathematical concepts and relationships in preparation for the quantum mechanics.

2- Definition of modern physical concepts from both theoretical and scientific perspectives.

3- Expanding the adequacy of students 'yield in pure atomic structure and nuclear radiations.

Required Textbooks	*Modern Physics, by SERWAY, R.A.; MOSES, C. J., MOYER, C. A 3rd ed. Thomson Brooks Cole (2005)*
Essential References Materials	*Modern Physics for Scientists and Engineers, 4/e By Stephen T. Thornton & Andrew Rex, CENGAGE Learning/Brooks Cole* *Major American Universities Ph.D. , Qualifying Questions and Solutions*

Course Description

College of science
Physics Department

Computer programming in physics

301 COMP-3

1. COURSE DESCRIPTION

This course provides a brief overview of computer engineering and its development, in addition to a brief idea of computers for languages, their classification, and development, and then the focus is on teaching students programming principles such as C ++ and MATLAB. In addition to training the student to apply that in matters of interpolation, numerical integration, and numerical differentiation.

2. COURSE MAIN OBJECTIVE

The purpose of this course is to teach the students fundamentals of programming and Numerical methods in physical sciences.

Required Textbooks	*Red hat Linux Bible Christopher Negus Publisher: Wiley–dreamtech India Pvt. Ltd* *-The C++ Programming Language: Special Edition Bjarne Stroustrup Publisher: Pearson Education ISBN: 0-201-88954-4* *-Numerical Methods Pallab Ghosh Publisher: Prentice Hall of India Private Ltd, New Delhi ISBN: 81-203-2987-2* *-An Introduction to Computational Physics Tao Pang Publisher: Cambridge University Press ISBN-13: 978-0-521-82569-6* *ISBN-10: 0-521-82569-5*
Essential References Materials	*Richard L. Burden Publisher: Brookscrole publications ISBN: 0-534-35187 - 5* *-Numerical Methods for Engineers and Scientists, Second Edition Joe D. Hoffman . ISBN: 0 – 8247-0443-6 Publisher: Marcel Dekker, Inc., New york*

Course Description

College of science
Physics Department

Electronics

324 PHYS-3

1. COURSE DESCRIPTION

This course is an application of the concepts of semiconductors and is of particular interest to physicists. The electronics is one of the natural branches of physics. It is concerned with types and properties of semiconductor materials also, It is also includes the electronic devices, such as types and applications of didoes and types and applications of transistors and digital electronics.

2. COURSE MAIN OBJECTIVE

The main objectives of this course:
1- Learn about the physics and properties of pure and grafted semiconductors
2 - Knowing the basic concepts and principles of electronics science, highlighting their importance from the point of view Scientific and applied.
3 - Learn about a number of electronic devices such as diodes and transistors and their applications in logic circuits.

Required Textbooks	*ELECTRONIC PRINCIPLES, EIGHTH EDITION by Albert alvino, Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121*
Essential References Materials	*Fundamentals of Electronics: Book 1 Electronic Devices and Circuit Applications Thomas, 2015, by F. Schubert, Jr. and Ernest M. Kim www.morganclaypool.com*

Course Description

College of science
Physics Department

Practical Electronics

325 PHYS-2

1. COURSE DESCRIPTION

This course gives an experimental view of the electronic devices, which were introduced to them theoretically in the course PHYS-324. This course presents an overview of physical measurements techniques, scientific data analysis, error calculations and a general revision of how to write scientific report. Also, it focuses on conducting and interpreting a group of experiments in Electronics. Electronic devices like diodes, various transistors and various amplifiers will be discussed deeply.

2. COURSE MAIN OBJECTIVE

The aims of the Course are to enable learners to develop:

♦ knowledge and understanding of key concepts in electronics and apply these in a range of fields

♦ Acquisition a range of practical skills in electronics, including skills in analysis and problem solving, design skills, skills in the safe use of tools and equipment.

♦Understand the role and impact of electronics in life.

Required Textbooks	*Electronics laboratory experiments Manual – Prepare of Department of Physics - faculty of science –KKU.*
Essential References Materials	*Satya Sai Srikant • Prakash Kumar Chaturvedi, Basic Electronics Engineering Including Laboratory Manual, pringer Nature Singapore Pte Ltd.. ISBN 978-981-13-7413-5 ISBN 978-981-13-7414-2 (eBook) https://doi.org/10.1007/978-981-13-7414-2*

Course Description

College of science
Physics Department

Electromagnetic Theory I

326 PHYS-2

1. COURSE DESCRIPTION

This course is considered advanced theoretically in the field of electromagnetism, and it is concerned with Vector Analysis- Multiplication of Vectors-Curvilinear Coordinates-differential operator (Del operator)- Gradient-Flux- Divergence-Rotation or curl of vector -Integral vector calculus-Divergence Theorem (Green Theorem)- Stokes' Theorem. -Coulomb's Law-The Electric Field - Electric Field of a continuous charge distribution - Charge density- Gauss's law- Potential difference and electric potential- Laplace's Equation and Poisson's Equation- Current and current density -The law of conservation of electric charge (Continuity equation). -Multipoles and insulators-Electric potential of a dipole-The linear electric quadrupole- Free charges and bound charges- Insulators and Gauss's law. -Magnetic Fields- The Biot - Savart law -The magnetic field of a solenoid-Magnetic Flux- Gauss's law in magnetism-The Vector Potential. - Ampere's Law-Displacement current and general form of Ampere's Law- Faraday's Law- Len's law- Maxwell's equations.

2. COURSE MAIN OBJECTIVE

The objectives of this course are to teach fundamentals of Electromagnetic theory I to the students. After completion of this course, students will be able to the following;

Introduce the basic mathematical concepts related to electromagnetic vector fields.

Impart knowledge on the concepts of electrostatics, electric potential, energy density and `their applications.

Impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.

Impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations

Required Textbooks	*David J. Griffiths, Introduction to Electrodynamics, third edition, 1999, Benjamin Cummings. ISBN 13: 978-0138053260*
Essential References Materials	*Bhag Singh Guru, Electromagnetic Field Theory Fundamentals, 2nd edition, 2004, Cambridge University Press. ISBN 13: 9780872208896* *- John R. Reitz, Frederick J. Milford, Robert W. Christy, Foundations of Electromagnetic Theory, 4th edition, 1992, Publisher: Addison Wesley. ISBN 10: 0201526247*

Course Description

College of science
Physics Department

Statistical Physics

343 PHYS-3

1. COURSE DESCRIPTION

This course improves concepts in classical laws of thermodynamics and their applications, postulates of statistical mechanics, statistical interpretation of thermodynamics, microcanonical, canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac, and photon gases; selected topics from low-temperature physics and electrical and thermal characteristics of matter are discussed.

2. COURSE MAIN OBJECTIVE

The objectives of this course are to develop an understanding of the statistical nature of the laws of thermodynamics, to examine the basic theory of statistical mechanics, and to apply this theory to a wide variety of interesting problems.

Required Textbooks	- *Kerson Huang, Introduction to Statistical Physics, Second Edition, 2009, Chapman and Hall/CRC. ISBN 13: 9781420079029* - *Frederick Reif, Fundamentals of Statistical and Thermal Physics, Waveland Pr Inc (2008*
Essential References Materials	*Leonard K. Nash, Elements of Statistical Thermodynamic, Second Edition, Dover Publications, 2006, ISBN 10:1306348706* *Daniel J. Amit, Yosef Verbin, Rami Tzafriri, Statistical Physics: An Introductory Course, 1999, World Scientific Publishing Company. ISBN 13: 9789810248635*

Course Description

College of science
Physics Department

Quantum Mechanics I

354 PHYS-3

1. COURSE DESCRIPTION

This course deals with one of the branches of theoretical physics and deals with the delicate physical problems that Conventional mechanics can't solve. It is concerned with the basic assumptions of quantum mechanics - functions Waveform and its properties - The Schrödinger Equation- Particle in a Potential Well - Scattering of Particles by Barriers and Wells - The Linear Harmonic Oscillator - he Formal Structure of Quantum Mechanics - Orbital Angular Momentum in Quantum Mechanics - Spherically Symmetric Potentials and
Hydrogenic Atoms.

2. COURSE MAIN OBJECTIVE

Quantum Mechanics 1 aims to:
1. - Continuation of the concepts introduced in modern physics by studying Principles of Quantum Mechanics and Schrödinger Equation
2..Introducing quantum mechanics and its importance in solving physical problems in the microscopic world and electronic physical phenomena, without which there is no convincing solution or explanation for these phenomena.
3.Building a strong scientific background to understand the vocabulary of advanced courses in quantum mechanics.

Required Textbooks	*D. J. Griffiths, Introduction to Quantum Mechanics, Second Edition, Pearson International edition. 1995.*
Essential References Materials	*M. C. Jain, Quantum Mechanics A text book for undergraduate, 2007 by PHI learning Private Limeted.*

Course Description

College of science
Physics Department

Electromagnetic Theory 2

427 PHYS-2

1. COURSE DESCRIPTION

This course completes the practical aspects of Electromagnetic Theory 1 (326 Phys). It deals with the reflection and refraction of electromagnetic waves, electromagnetic radiation, electromagnetism fields and potentials, relativity theory.

2. COURSE MAIN OBJECTIVE

The objectives of this course are to teach fundamentals of Electromagnetic theory I to the students. After completion of this course, students will be able to the following;
The student should differentiate between Maxwell equations in a vacuum and in other mediums.

- *The student should know how to interpret Maxwell equations*
- *The student should know the plane electromagnetic waves in vacuum, in insulators, in conductors, and in plasma*
- *The student should be able to explain the reflection and transmission of electromagnetic waves*
- *The student should know electric and magnetic radiation*

Required Textbooks	*David J. Griffiths, Introduction to Electrodynamics, third edition, 1999, Benjamin Cummings. ISBN 13: 978-0138053260* *- -Paul Lorrain, Dale R. Corson, Electromagnetic Fields and Waves: Including Electric Circuits, (1988), W.H. Freeman & Company. ISBN 13:9780716718239*
Essential References Materials	*Bhag Singh Guru, Electromagnetic Field Theory Fundamentals, 2nd edition, 2004, Cambridge University Press. ISBN 13: 9780872208896* *- John R. Reitz, Frederick J. Milford, Robert W. Christy, Foundations of Electromagnetic Theory, 4th edition, 1992, Publisher: Addison Wesley. ISBN 10:*

Course Description

College of science
Physics Department

Practical Atomic and Modern Physics

455 PHYS-2

1. COURSE DESCRIPTION

It is a purely practical course in which the student personally conducts a number of advanced experiments in physics modern and atomic and applies the concepts mentioned in decision 353 phys.., it focuses on conducting and interpreting a group of experiments in the atomic level which were lead to the appearance of modern physics. Phenomena like photoelectric effect, thermionic emission, mass spectroscopy, etc. will be discussed deeply.

2. COURSE MAIN OBJECTIVE

The aim of this course is to provide the students with the opportunity to apply the knowledge they have learned in modern physics subjects, to gain the ability to conduct experiments, collect and analyze related data.

The course of practical atomic and modern physics aims:

-To give students a deep knowledge about the concepts, ideas, and methods of modern physics through a group of practical experiments.

- To train students to conduct and interpret experiments in modern physics.

- To develop students' ability and skills to detect and analyze phenomena in modern physics

- To expertise in physical measurement techniques and scientific data analysis, and to write their own reports.

Required Textbooks	*Modern physics laboratory experiments – Prepare of Department of Physics -faculty of science –KKU.*
Essential References Materials	*L¨utfi Ozy¨uzer ¨,Ozan Arı, Atike Ince, Experiments in Modern Physics Lab. Manual, Izmir Institute of Technology, 2010.* *https://physics.iyte.edu.tr/wp* *-Modern Physics for Science and Engineering, First Edition Marshall L. Burns, Tuskegee University*

Course Description

College of science
Physics Department

Atomic and Spectra

461 PHYS-3

1. COURSE DESCRIPTION

This course examines one of the basic branches of modern physics in some detail on a quick review of the Bohr atom, the optical spectrum, the hydrogen spectrum, and then the hydrogen atom, quantum mechanics and the influence of external fields on the atom as the Stark effect, effect and effect - atoms are multiple, the periodic system and the cortical structure then move to the Schrödinger equation for particles, the electron spectrum of molecules.

2. COURSE MAIN OBJECTIVE

This course aims to:
- Learn the basic concepts and principles of atomic and the foundations of spectral emission while highlighting their importance Practical and scientific.
-Acquire the undergraduate students the subsequent models of the atom from Thomson to Schrödinger Models.
-Develop students' practical achievement and preparing them for advanced fields in practical life and scientific and applied research.

Required Textbooks	*B.H. Bransden, C.J. Joachain, Physics of Atoms and Molecules (1982), Longman Publishing Group. ISBN 13:9780582444010*
Essential References Materials	*Robert Duane Cowan, The Theory of Atomic Structure and Spectra, 4th edition (2001), Univ. of California. ISBN 13:9780520038219*

Course Description

College of science
Physics Department

Solid State Physics 1

471 PHYS-3

1. COURSE DESCRIPTION

This course is intended to provide an introduction to the physics of solids., where it is concerned with the crystal structure of materials, crystalline bonds, and forces between single atoms in X-rays crystals, crystal lattice vibrations, and thermal properties of solids also cover the heat and electrical conductivity in solids.

2. COURSE MAIN OBJECTIVE

This course aims to establish some fundamental concepts in solid-state physics. It gives students basic principles on solid-state physics. The most important goals can be summarized as follows: Students will gain knowledge of basic theories of solid-state structure.

Students will acquis knowledge of basic theories of the electronic structure of materials.

Students will learn how solid-state theory is applied to describe physical behavior of solids and electronic devices.

Required Textbooks	*Charles Kittel, Introduction to Solid State Physics (Wiley: New York, 2004).* *-M. Ali. Omar, Elementary Solid State Physics: Principles and Applications, 1975, Addison-Wesley. ISBN 13: 9780201054828*
Essential References Materials	*Dekker A.J., Solid State Physics 1st Edition (2000), Publisher: Pan Macmillan, SBN: 9780333918333, 0333918339*

Course Description

College of science
Physics Department

Nuclear Physics I

481 PHYS-3

1. COURSE DESCRIPTION

The course introduces the fundamental principles that underline nuclear science and its applications, as well as the mathematical tools needed to grasp these concepts. Applications to nuclear science will be used to illustrate these principles.

2. COURSE MAIN OBJECTIVE

The main targets of this course to learn;
1- The concepts to describe nucleus in terms of their structure.
2- Studying the static and dynamic properties of the nucleus. Studying the properties of the nuclear forces.
3- Studying nuclear radiation physics, the general low of decaying, half-lives, specific activity. The alpha decay, beta decay, and gamma decay.
4- Studying the radiation units. Studying the nuclear reactions. On the other hand, the student tries to make reports about different topics of nuclear physics.
In addition, the student should develop the ability to solve problems and think critically by applying their acquired knowledge of physics to various problems.

Required Textbooks	*Kenneth S. Krane, Introductory Nuclear Physics, 3rd edition (1987), John Wiley & Sons;*
Essential References Materials	*Bernard Leonard Cohen, Concepts of Nuclear Physics, 1st edition (1971), McGraw-Hill. ISBN-13 : 978-0070115569*

Course Description

College of science
Physics Department

Graduation Project

492 PHYS-3

1. COURSE DESCRIPTION

This course deals with a specific research point that the student conducts under the supervision of a specialized faculty member

Graduation research is divided into two types:

1- Research in theoretical and mathematical physics.

2- Research in experimental physics.

In addition to a theoretical hour in which the student receives foundational lectures in the field of research and its methods and its requirements.

2. COURSE MAIN OBJECTIVE

Graduation project provides students with opportunities to apply and implement the skills gained during all other courses studied in the B.SC. program toward providing solutions to specific problems. The graduation project provides the opportunity for students to work in groups under staff supervision. The graduation project is the last step in preparing the student for professional practice after graduation and therefore is considered an opportunity to apply and demonstrate the students' accumulation of knowledge, skills and experiences throughout their undergraduate education. All the students' education including lectures, tutorials, discussion groups, labs, seminars, field trips, and industrial training should be reflected in the graduation projects. It requires continuous work and commitment to achieve the required goals. It is recommended that the selected project represents an actual need of the industry or the scientific community. This reflects the message of the faculty and the university. Students are encouraged to select new topics and involve other departments and disciplines, where applicable, in their graduation projects.

Required Textbooks *Books, lecture notes, internet and any source relating to the subject of project.*

Course Description

College of science
Physics Department

Quantum Mechanics II

456 PHYS-2

1. COURSE DESCRIPTION

Course of Quantum Mechanics II complements the Quantum Mechanics 1 course. The scope of the present course may be gauged from the Contents. Each chapter consists of a succinct presentation of the physical principles, followed by a large number of completely solved problems which are a valuable learning tool and naturally develop the subject and illustrate these principles. The solved problems have been made short and have been ordered in terms of difficulty. This course consists of five chapters:

1- Quantum mechanics theory with an introduction to Dirac notation.
2- The infinite square well.
3- The basic postulates of the theory of Quantum Mechanics.
4- The angular momentum of particles (quantum approach).
5- Perturbation and approximations methods.

2. COURSE MAIN OBJECTIVE

The main purpose of this course is to teach the students number of concepts, methods and skills in the field of quantum physics. The students will be able to demonstrate their understanding of the foundations in this domain (mathematical foundations applied for quantum mechanics theory, the main postulates for the theory of quantum mechanics, the perturbation, WKB, and Variational approximations for solving time-independent Schrodinger's equation) by demonstrating competence in the major through appropriate homework assignments and examinations, particularly in their upper-level physics courses. Encouraging the student to increase the lecture attendance and to wake up his scientific curiosity towards the subjects of quantum physics II is also the objective of this course.

Required Textbooks	*D. J. Griffiths, Introduction to Quantum Mechanics, 2nd Edition (2005), Pearson Education International. ISBN 0-13-191175-9.*
Essential References Materials	*N. Zelliti, John, Quantum Mechanics-Concepts and Applications, 2nd Edition (2009), Wiley and Sons, LTD. ISBN: 0-471-48943-3.*

Course Description

College of science
Physics Department

Light and Laser

462 PHYS-2

1. COURSE DESCRIPTION

It is one of the advanced courses in physics and it examines the precise processing of the optics of solid materials and deduces their various properties, then moves to laser physics, including optical resonators, methods of producing laser beams, the properties of these rays, and their various applications, as well as some real lasers.

It can be concluded the topics of this course as follows:

- *Overview of optical materials and classification of optical processes.*
- *Parameters that determine the properties of the medium at the macroscopic level.*
- *The complex refractive index and dielectric constant*
- *Principles and properties of laser radiations*
- *Concepts of light amplification and optical resonators*
- *Three levels and four levels laser systems*

Principles, construction, and working of different types of lasers-Applications of lasers

2. COURSE MAIN OBJECTIVE

The main objectives of this course are

A- The student should understand the precise treatment of solid optics and be able to solve their problems and become familiar with some modern phenomena and their applications.

B- The student should understand the nature of laser light, how to produce it, and how to design optical resonators, study some real lasers and learn about applications

Modern and diverse lasers.

C - That the student develops his abilities to inform and research in the field of modern scientific discoveries.

Required Textbooks	*Grant R. Fowles, Introduction to modern optics, 2 Edition, (1989) Dover Publications. 9780486659572* *William T. Silfvast, Laser fundamentals, 2nd ed, (2004), Cambridge University Press. ISBN 13: 9780521541053*
Essential References Materials	*Eugene Hecht, Optics, 4th Edition, Pearson Addison Wesley Optical properties of solids, Mark Fox, Oxford university press* *Mark Csele, Fundamentals of Light sources and Lasers, John Wiley & Sons, Inc., Hoboken, New Jersey*

Course Description

College of science
Physics Department

Solid State physics II

472 PHYS-2

1. COURSE DESCRIPTION

This course complements the advanced concepts of solid state physics, some of which were mentioned in Physics 471, and it includes this course The bands theory, crystalline semiconductors, dielectric materials, magnetic, paramagnetic, and ferromagnetic mirrors, as well as sheds light on magnetic resonance, and an introduction to superconductors

2. COURSE MAIN OBJECTIVE

This course aims to complete the concepts of Solid State Physics 1. It gives students some advanced principles and concepts on solid-state physics. The most important goals can be summarized as follows:

1) Students will gain knowledge of basic theories of dielectric and magnetic materials.

2) Students will acquis knowledge of basic theories of magnetic resonance, and an introduction to superconductors

3) Students will learn how solid-state theory is applied to describe physical behavior of solids and electronic devices.

4) The student is introduced to the thermal, magnetic, dielectric, electrical and optical properties of solids

Required Textbooks	*- Charles Kittel, Introduction to Solid State Physics (Wiley: New York, 2004).* *-H. D. Young and R. A. Freedman, University Physics, 9th edition, Addison-Wesley, Reading, MA (1996).*
Essential References Materials	*-M. Ali. Omar, Elementary Solid State Physics: Principles and Applications, 1975, Addison-Wesley. ISBN 13: 9780201054828* *-Dekker A.J., Solid State Physics 1st Edition (2000), Publisher: Pan Macmillan, SBN: 9780333918333, 0333918339*

Course Description

College of science
Physics Department

Practical Solid-state Physics.

473 PHYS-3

1. COURSE DESCRIPTION

It is an applied practical course on the courses phys.471 and phys. 471 in which the student personally conducts a number of advanced experiments in solid state physics.

2. COURSE MAIN OBJECTIVE

The student is trained to do by himself a number of advanced experiments on solid state physics- study many important physical phenomena and develop his knowledge and technical skill in the laboratory- In completing the course, the student becomes capable of applying all practical procedures included in the course and increasing his knowledge about the modern technology. In addition, this course presents an overview of physical measurement techniques, scientific data analysis, and error calculations, and a general revision of how to write scientific reports relating to the laboratory of solids.

Required Textbooks	*Solid state physics laboratory experiments Notes – Prepare of Department of Physics -faculty of science –KKU.*
Essential References Materials	*Charles Kittel, Introduction to Solid State Physics (Wiley: New York, 2004).*

Course Description

College of science
Physics Department

Nuclear Physics II

482 PHYS-2

1. COURSE DESCRIPTION

This course completes the necessary topics that were not covered in Course 481 Phys Elementary particles and their interactions, where it is concerned with a number of important topics such as nuclear accelerators and nuclear detectors and their applications. It also helps the student to understand and interpret many nuclear phenomena.

2. COURSE MAIN OBJECTIVE

1) Learn the basic principles of elementary reactions and classification of elementary particles.
2) Expanding the students' scientific base in understanding and interpreting various nuclear phenomena.
3) Introduce students to the role that nuclear physics plays in various applications.

Required Textbooks	*Donald H. Perkins, Introduction to High Energy Physics, 4th edition (2000). Cambridge University Press;*
Essential References Materials	*Kenneth S. Krane, Introductory Nuclear Physics, 3rd edition (1987), John Wiley & Sons.*

Course Description

College of science
Physics Department

Practical Nuclear Physics

483 PHYS-2

1. COURSE DESCRIPTION

It is an applied practical course on the courses phys.481 and phys. 482 in which the student personally conducts a number of advanced experiments in nuclear physics.

2. COURSE MAIN OBJECTIVE

The student is trained to do by himself a number of advanced experiments on nuclear physics- study many important physical phenomena and develop his knowledge and technical skill in the laboratory- In completing the course, the student becomes capable of applying all practical procedures included in the course and increasing his knowledge about the modern technology. In addition, this course presents an overview of physical measurement techniques, scientific data analysis, and error calculations, and a general revision of how to write scientific reports relating to the Nuclear laboratory.

Required Textbooks	*Nuclear physics laboratory experiments – Prepare of Department of Physics - faculty of science –KKU.* *Bryan, Jeff C., Katz, Sidney A, Experiments in Nuclear Science, 1st Edition (2011), CRC Press. ISBN 13:978-1-4398-8886-5*
Essential References Materials	*Introductory Nuclear Physics, Kenneth S. Krane, John Wiley & Sons; 3rd edition (1987).* *Laboratory Manual: Nuclear Science Experiments, with Digital Electronics, WWW.CANBERRA.COM*

Course Description

College of science
Physics Department

Special topics

492 PHYS-2

1. COURSE DESCRIPTION

It is a specialized, selective course that deals with one of the important topics not covered in any of the mentioned courses. In the plan, such as the physics of renewable energies - physics of the environment - astrophysics - biophysics - physics Plasma. In this description we will focus on energy sources. Keeping the lights on, gasoline in our cars, and our homes comfortable, requires energy resources. These include coal, petroleum, methane, uranium, biomass, water, wind, geothermal, and sunlight. Knowing how we measure, acquire and use these resources is critical information because human population and income aspirations are increasing, while access to the means of prosperity—energy dense and affordable resources—is at best uneven. This course provides you with the tools you need to better understand the energy resources we currently use, and empowers you with the information you need to pursue the energy resources we want to use in our future.

2. COURSE MAIN OBJECTIVE

The course objectives define the student learning outcomes for a course. On completion of this course, students should be able to: analyze renewable energy systems using appropriate tools from the fields of thermo-fluids, heat transfer, and dynamics; critically compare and contrast various combustion and renewable energy systems; evaluate the potential of renewable energy technologies as a replacement for fossil fuel combustion energy technologies.

Required Textbooks	*GEORGE C. KING, Physics of Energy Sources, 2018 John Wiley & Sons, Ltd.*
Essential References Materials	*-G.D. -*Rai, Non-Conventional energy Sources, Khanna Publishers.* *-D P Kothari, K C Singal & Rakesh Ranjan, Renewable Energy Sources& Emerging Technologies, Prentice Hall India.*

7 Graduate attributes

Graduate attributes

Commitment to Islamic identity and values

Extensive knowledge in the field of specialization

Specialized knowledge and skills practice

Self- and Continuous learning

Problem analysis and-solving skills, critical thinking, and decision-making skills

Effective communication skills, taking initiative, teamwork, and leadership skills

8 Contact

Contact with the department

Male Section:

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