# CURRICULUM

## Associate Degree in Physics
## With effect from Academic Year 2023
(As per HEC Undergrad Policy 2023)

## INSTITUTE OF PHYSICS

## BAHAUDDIN ZAKARIYA UNIVERSITY, MULTAN

Approved by Board of faculty of Science.

PROF. DR.
DEAN, FACULTY OF SCIENCE
BAHAUDDIN ZAKARIYA UNIVERSITY,
MULTAN

DIRECTOR
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# Associate Degree Program in Physics
## (w.e.f 2023 on wards)

| | |
|---|---|
| Degree Awarded | Associate degree in Physics |
| Entrance Requirement | • Intermediate with Physics, securing at least 45% marks in aggregate and in the subject of Physics.<br>• Any other examination of Foreign University/Institution/ examining body, equivalent and percentage of marks will be determined by IBCC. |
| Duration of the Program | 2years (4 semesters). |
| CGPA Requirement | The minimum CGPA required for the award of the degree will be 2/4. |
| Total credit hours | 68 |
| Field Experience/Internship | Only applicable where prescribed by the respective Accreditation Council, National Curriculum Review Committee or the concerned University |
| General Education Courses | 12 (31 credit hours) |
| Distribution Courses | 2 (6 credit hours) |
| Major Courses | 13 (31 credit hours ) |

- The course codes are allotted in three digits: the first digit indicates the year in which the course is offered. The rest of the two numbers indicates the number of the course. Preferably the odd number courses are offered in odd semesters and even number courses are offered in even semesters.

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# SCHEME OF STUDY

Associate Degree in Physics Effective from 2023 onwards

## First Year

### First Semester

| Course code | Course title | Credit Hours | |
|---|---|---|---|
| QREA 101 | Quantitative Reasoning (Calculus-I) | 3+0 | G |
| EWRT 101 | Functional English | 3+0 | G |
| GE 101 | Applications of information communication Technologies (ICT) | 2+1 | G |
| ISTS/ETHC 101 | Islamic Studies/Ethics | 2+0 | G |
| PHYS 101 | Mechanics-I | 3+0 | M |
| PHYS 103 | Physics Lab-I | 0+1 | M |
| ARAB101 | Translation of the Holy Quran I | - | C |
| | | Total 15 | |

### Second Semester

| Course code | Course title | Credit Hours | |
|---|---|---|---|
| QREA 102 | Quantitative Reasoning (Calculus-II) | 3+0 | G |
| EWRT 102 | Expository Writing | 3+0 | G |
| PAKS 102 | Ideology and Constitution of Pakistan | 2+0 | G |
| xxxx xxx | Arts and Humanities (Languages and Literature Arabic/Chinese) | 2+0 | G |
| PHYS 104 | Waves and Oscillations | 3+0 | M |
| PHYS 102 | Mechanics-II | 3+0 | M |
| PHYS 106 | Physics Lab II | 0+1 | M |
| ARAB 102 | Translation of the Holy Quran II | - | C |
| | Total | 17 | |

## Second Year

### Third Semester

| Course code | Course title | Credit Hours | |
|---|---|---|---|
| CICE 201 | Civics and Community Engagement | 2+0 | G |
| xxxx xxx | Natural Sciences (Analytical Chemistry) | 2+1 | G |
| MNGT 201 | Human Resource Management | 3+0 | D |
| PHYS 201 | Electricity and Magnetism -I | 3+0 | M |
| PHYS 203 | Physics Lab-III | 0+1 | M |
| PHYS 205 | Environmental Physics | 3+0 | M |
| PHYS 207 | Introduction to Astronomy | 3+0 | M |
| ARAB 201 | Translation of the Holy Quran III | - | C |
| | Total | 18 | |



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## Fourth Semester

| Course code | Course title | Credit Hours | |
|---|---|---|---|
| MNGT 112 | Entrepreneurship | 3+0 | G |
| XXXX XXX | Social Sciences (Economics/Education/ Law and Legislature) | 2-0 | G |
| COMP 202 | Programming Fundamentals | 2+1 | D |
| PHYS 204 | Heat and Thermodynamics | 3+0 | M |
| PHYS-206 | Electricity and Magnetism-II | 3+0 | M |
| PHYS 208 | Electronics and Modern Physics | 3 0 | M |
| PHYS 210 | Physics Lab IV | 0+1 | M |
| ARAB 202 | Translation of the Holy Quran IV | - | C |
| | Total | 18 | |

Formula for determination of credits:

Credits of major = Total Credit program-Gen Edu.courses-Dist.courses-Minors (Elecuve)

= 68-31-06-0 = 31CH

M = Major Courses:13 (31 CH)
D = Distribution Courses:02 (06 CH)
G = General Education Courses: 12 (31 CH)
C = Compulsory

Total = 68 CH

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## COURSES FOR BACHOLAR OF SCIENCE IN PHYSICS PROGRAM

Table-1 General Education Courses

| Sr. No. | Title | Code | Courses | Credit Hours |
|---|---|---|---|---|
| 1 | Natural Sciences | XXX XXX | 01 | 3(2+1) |
| 2 | Arts and Humanities | XXX XXX | 01 | 02 |
| 3 | Social Sciences | XXX XXX | 01 | 02 |
| 4 | Ideology and Constitution of Pakistan | PAKS 102 | 01 | 02 |
| 5 | Islamic Studies/Ethics (for non-Muslims only) ** | ISTS/ETHC 101 | 01 | 02 |
| 6 | Quantitative Reasoning ** | QREA 101 | 02 | 6+0 |
| 7 | Expository Writing** | EWRT 101 | 01 | 03 |
| 8 | Functional English** | | 01 | 03 |
| 9 | Applications of information communication Technologies** | ICT 201 | 01 | 2+1 |
| 10 | Civics and Community Engagement ** | | 01 | 02 |
| 11 | Entrepreneurship ** | | 01 | 03 |
| | | | 12 | Total: 31 CH |

** HEC model courses may be used by the University.

Table 2: List of Courses for disciplines of Social Sciences and Arts & Humanities notified by the HEC Vide notification No. DD/SS & H /CDSSHP/List /2015 dated 03-02-2021.

***Note: This list is not Ultimate list. Any courses out of the subjects of these three categories may be offered with their curriculum to be taken from the BZU approved curriculum of the respective subjects/Departments subject to the requirement of meeting the prerequisites. The list of subjects of social science courses and arts and humanity courses as specified in the HEC Notification of No. DD/SS & H/CDSSHP/List/2015 dated 03.02.2015.***

| Social Science Subjects | |
|---|---|
| Archeology | Ethnography |
| Anthropology | Conservation Studies |
| Archival Studies | Religious studies/ Comparative Religion |
| Economics | Islamic Studies/ Arabic Studies |
| Econometrics | Education |
| Disaster Economics | Special Education |
| Political Science | Law and Legislature |
| Public Administration | Home Economics |
| Defense & Strategic Studies | Pakistan Studies |
| International relations | Peace and Conflict Studies |
| Psychology including Clinical, Industrial, Development Psychology | Behavioral Science |



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| | |
|---|---|
| Philosophy | Women and Gender Studies |
| Sociology | American Studies |
| Iqbal Studies/ Iqbaliyat | Area Studies |
| Rural and Development Studies | Development Studies |
| Social Work | Journalism |
| Criminology | Mass Communication |
| Library and Information Sciences | Media Studies |
| History | Rural / Urban Studies |
| Demography and Population Studies | Women Studies |
| **Arts & Humanities Courses** | |
| Fine Arts | Translation Studies |
| Liberal Arts | Museology (Meuseum Science) |
| Photography | Curational Studies |
| Performing Arts | Design |
| Musicology | History of Art and Design |
| Film/ Film Production | Architecture |
| Physical Education and Sports | Urban and Town Planning |
| Languages and Literature | Pedagogy of Arts & Design |
| Professional Practices | Visual Arts |

**Table 3: List of Course titles for various options of General Education Courses**

| Sr. No. | Subjects | Course titles |
|---|---|---|
| 1. | Natural Sciences | |
| 1.1 | Mathematics | Group Theory & Metric Spaces, Linear Algebra and Differential Equations |
| 1.2 | Chemistry | Physical Chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry |
| 2 | Social Sciences | Any course out of the subjects mentioned Table 2 may be offered with their curriculum to be taken from the BZU approved curriculum of the respective subject/Department subject to the requirement of meeting the prerequisites. |
| 3 | Arts and Humanities | Any course out of the subjects mentioned Table 2 may be offered with their curriculum to be taken from the BZU approved curriculum of the respective subject/Department subject to the requirement of meeting the prerequisites. |
| 4 | Quantitative reasoning | Calculus I, Calculus II, Introductory Statistics for Physicists |

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**Table 4: Distribution Courses**

| Sr. No. | Code | Title | Credit Hours |
|---|---|---|---|
| 1 | COMP 101 | Introduction to Computers and its Applications | 3-0 |
| 2 | ORGB 4 01 | Organizational Behaviour | 3+0 |
| 3 | MNGT 201 | Human resource Management | 3+0 |
| 5 | MNGT 301 | Industrial Marketing | 3+0 |
| 6 | MNGT 401 | Principles of Marketing | 3+0 |
| 7 | COMP 201 | Computer programming with python | 2+1 |
| 8 | EDUC 301 | Teaching & Learning Strategies | 3+0 |
| 9 | MNGT 302 | E- Business & marketing | 3+0 |
| 10 | COMP 202 | Programming Fundamentals | 2+1 |

**Table 5: List of Major Courses**

| Sr. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | PHYS 101 | Mechanics-I | 3+0 |
| 2 | PHYS 102 | Mechanics-II | 3+0 |
| 3 | PHYS 103 | Physics Lab-I | 0+1 |
| 4 | PHYS 104 | Waves and Oscillations | 3+0 |
| 5 | PHYS 201 | Electricity and Magnetism-I | 3+0 |
| 6 | PHYS 106 | Physics Lab-II | 0+1 |
| 7 | PHYS 206 | Electricity and Magnetism-II | 3+0 |
| 8 | PHYS 203 | Physics Lab-III | 0+1 |
| 9 | PHYS 204 | Heat and Thermodynamics | 3+0 |
| 10 | PHYS 205 | Environmental Physics | 3+0 |
| 11 | PHYS 208 | Electronics and Modern Physics | 3+0 |
| 12 | PHYS 210 | Physics Lab IV | 0+1 |
| 13 | PHYS 207 | Introduction to Astronomy | 3+0 |
| | | Total | 31 CH |

**Courses to be Approved**

**Note: The contents of all courses given in the scheme of studies (Major, Elective, Distribution & General) have been approved already by statutory bodies except *Introduction to Astronomy*, *Application of Information & Communication Technologies and Programming Fundamentals* content of which are hereby attached for approval.**

**Moreover the title of the E-Commerce & Business is changed to E-Business & Marketing.**

**The course codes of** Human Resource Management, Industrial marketing, Principles of marketing, Teaching and learning Strategies, E-Business & Marketing has been changed accordingly as listed in Table-4.

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**PHYS 207** **Introduction to Astronomy** **3CH**

The solar system, nature and evolution of stars, white dwarfs, neutron stars, and black holes, galaxies, quasars and dark matter,The night sky and its motion, Astronomical instruments and observation techniques, The sun and the planetary system, exoplanets. The distances to the stars and their motion, The structure and evolution of stars, The space between the stars, The Milky Way and other galaxies, Theories of the origin and development of the universe, the large scale structure of the universe, the Big Bang and Inflation.

Books:


1. Edward Harrison: Cosmology: The Science of the Universe 2nd Edition SBN-13: 978-0521661485 (2001)
2. Edward Harrison: Cosmology: The Origin and Development of the Universe: Royal Astronomical Society USA (2000)
3. Carroll, Bradley W., and Dale A. Ostlie. *An Introduction to Modern Astrophysics*. Reading, MA: Addison-Wesley Pub. ISBN: 9780201547306. (1995)
4. Kippenhahn, Rudolf, and Alfred Weigert. *Stellar Structure and Evolution*. New York, NY: Springer-Verlag, ISBN: 9780387502113. (1990).
5. Shapiro, Stuart L., and Saul A. Teukolsky. *Black Holes, White Dwarfs, and Neutron Stars*. New York, NY: Wiley, ISBN: 9780471873167. (1983)


**ORGB-401** **Organizational Behavior** **3+0 CH**

- **Introduction to Organizational Behavior**
  - Organizational Disciplines and topics
  - Psychological Perspective
  - Social Psychological Perspectives
- **Structure and control in organization**
  - Introduction
  - Bureaucracy
  - Managerial Work
  - Contingency theory
  - Organizational Design
- **Individual and Work Learning**
  - Learning Theories
  - Learning and Work
- **Stress**
  - Types of Stress and Work
  - Occupational Stress Management
- **Individual Differences**

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- Personality and its factors
- Personality dimensions and Social Learning
- Intelligence

- **Motivation and Job Satisfaction**
  - Need at Work
  - Theories of Motivation and Job Satisfaction
  - Correlates of Job satisfaction
- **Perception**
- **Communication**
- **Group and Work**
  - Social Interaction
  - Dramaturgy and impression Management
  - Social Skill
- **Group and Inter group Behavior**
  - Group Structure & Norms
  - Group Processes & Formation
  - How throne Studies
- **Leadership**
  - Leadership as an attribute
  - Leadership Style
- **Pattern of Work**
  - Work-the classical approach
  - Marx, Weber & the critique of labor
  - Foucault & Disciplinary Power
- **Conflict and consent in Work**
  - The Labor Process debate
  - Work place control and resistance
  - Industrial conflict and industrial relation
- **Organizational Culture**
  - Organizational culture and strategic management
  - Exploring organizational culture
  - Evaluating concept of culture
- **Human Reliability**
- **Decision Making**
  - Decision making Theories
  - Decision making models
- **Power and Politics**
  - Types of Power
  - Gender Discrimination
  - Machiavellianism

**Recommended Books:**


1. Finchan, R.. & Rhodes, P. (2003), Princiles of Organizational Behavior, 3rd Oxford.
2. Noe, R., Hollenbeck, J. Gerhart, B., & Wright, P. (2006), Human Resource Management, 5th ed., McGraw Hill.
3. Newstrom John W. (2007), Organizational Behavior, (12th Ed.), McGraw-Hill.




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4. Luthan Fred, (2005), Organizational Behavior, McGraw-Hill Inc.
5. Robbins, Stephen, (2005), Organizational Behavior, McGraw-Hill Inc.
6. Organizational Behavior: An Introductory text by Buchanan &Huczynski

**ICT-101 Application of Information & Communication Technologies (2+1)CH**

Brief History of Computer, Four Stages of History, Computer Elements, Processor, Memory, Hardware, Software, Application Software its uses and Limitations, System Software its Importance and its Types, types of Computer (Super, Mainframe, Mini and Micro Computer) Introduction to CBIS (Computer Based Information System), Methods of input and Processing, Class2. Organizing Computer Facility, Centralized Computing Facility, Distributed Computing Facility, Decentralized Computing Facility, Input Devices, Keyboard and its Types, terminal (Dump, Smart, Intelligent), Dedicated Data Entry, SDA (Source Data Automation), Pointing Devices, Voice Input, Output and its Forms, Storage Units, Primary and Secondary Memories, RAM and its Types, Cache, Hard Disks, Working of Hard Disk, Diskettes, Raid, Optical Disk Storages (DVD, CD ROM), Magnetic Tapes, Backup System, Data Communications, Data Communication Model, data Transmission, Digital and Analog Transmission, Modems, Asynchronous and Synchronous Transmission, Simplex, Half Duplex, Full Duplex Transmission, Communications, Medias (Cables, Wireless), Protocols, Network Topologies (Star, Bus, Ring), LAN, WAN, MAN, Internet, A Brief History, Birthplace of ARPA Net, Web Link, Browser, internet Services Provider and Online Services Providers, Function and Features of Browser, Search Engines, Some Common Services available on Internet.

**Recommended Books:**

1. Charles S.Parker, Understanding Computers: Today and Tomorrow, Course Technology, 25 Thomson Place, Boston, Massachusetts 02210, USA
2. Livesley, Robert Kenneth. An introduction to automatic digital computers. Cambridge University Press, 2017.
3. Zawacki-Richter, Olaf, and Colin Latchem, "Exploring four decades of research in Computers & Education." Computers & Education 122 (2018): 136-152.

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COMP-202 **Programming Fundamentals** (2+1) CH

Introduction to problem solving , a brief review of Von-Neumann architecture, introduction to programing, role of compiler and linker, introduction to algorithms basic data type and variables, input/output constructs , arithmetic , comparison and logical operators, conditional statements and execution flow for conditional statements, repetitive statement and execution flow for repetitive statements lists and their memory organization, multi- dimensional lists, introduction to modular programing, function definition and calling stack rolling and unrolling, string and string operations, pointers/ references, static and dynamic memory allocation , File I/O operations.

**Recommended Books:**


1. Starting out with Python , 4th Edition Tony Gaddis.
2. Starting out with programming Logic and Degins, 4thEdition , Tony Gddis.
3. The C Programming Language , 2nd Edition by Brian W. Kerninghan , Dennis M. Ritchie.
4. Object Oriented Programming in C +– by Robert Lafore
5. Introduction to computation and programming using Python : with Application to understanding Data 2nd Edition by Guttag John
6. Practice of computing using Python 3rd Edition by William Punch and Richard Enbody
7. C How to program 7th Edition by Paul Deitel and Harvey Deitel
8. Problem solving and program Design in C ++ , 7TH Edition by Jeri R Hanly land Elliot B. Koffman


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