SHAHEED BENAZIR BHUTTO WOMEN UNIVERSITY PESHAWAR
REGISTRAR OFFICE (ACADEMICS SECTION)
Main Campus, Landay Sarak, Charsadda Road, Larama
Email: academics@sbbwu.edu.pk; Phone .No: 091-9224708

No: 55 12th BOF/19th Acad/49th Syn/Reg/SBBWUP
Dated: 19th April, 2024

NOTIFICATION

Subject: **General Education (Gen-Ed) Requirement and Mandatory Courses for all Departments**

The Syndicate in its 49th meeting held on 5th & 6th March, 2024 approved the ***"General Education (Gen-Ed) requirement and Mandatory Courses for all the Departments"*** with following recommendations made by Board of Faculties (Faculty of Sciences & Faculty of Social Sciences) in 12th meeting held on 24th October, 2023 and Academic Council in its 19th meeting held on 8th November, 2023:

1. **Recommendation made by Academic Council**
   i. The Academic Council approved the recommendations of Board of Faculties of Sciences and Social Sciences regarding the Course Contents of the following General Education Mandatory Courses as per the approval status. These courses shall be offered in all BS Programs.

General Education Mandatory Courses					
S. No.	**Department**	**Course Code**	**Course Title**	**Credit Hours**	**Approval Status**
1	English	ENG-303	Functional English	3	Course designed by the department is approved
2		ENG-304	Expository Writing	3	
3	Mathematics	MTH-401	Quantitative Reasoning I	3	Adopt the courses provided by HEC
4		MTH-402	Quantitative Reasoning II	3	
5	Islamiyat	ISL-301 / ISL-315 / **ETH-301**	Islamic Studies / Religious Education / **Ethics (in lieu of Islamic Studies only for non-Muslim students)**	2	- For Islamic Studies, adopt the course provided by HEC - For Religious Education, the task of designing the course was assigned to Dr. Naseem Akhtar and Dr. Zainab Amin, Associate Professors, Department of Islamiyat - **For Ethics, the course was approved**
6	Pakistan Studies	PST-313	Ideology and Constitution of Pakistan	2	Adopt the course provided by HEC
7	Computer Science	CSC-308	Application of Information and Communication Technologies	3(2+1)	
8	Management Science	MS-309	Introduction to Entrepreneurship	2	
9	Political Science	PSC-418	Civics and Community Engagement	2	
10	Political	AH-301	Art and Humanities	2	Decision mentioned at s.no. 3

	Science, English, Art & Design and History and Pakistan Studies				below

ii. The Academic Council perused the Course Religious Studies and observed the following:
   a. The course title of "Religious Studies" needs to be corrected as "Religious Education". Course Code of the said course is "ISL-315" and it has 2 Credit Hours.
   b. Course Outline of the course should be in paragraph form excluding the numbering as provided for the Academic Council agenda.

iii. The Academic Council decided the following regarding the course of Art and Humanities mentioned @ s.no. 10 of the above:
   a. The forum after perusing the Course Contents of the course "Art and Humanities" designed by the 4 members committee, directed to
      i. Add the Course Contents of **Pakistani Culture** which were missing in the designed course. The content may be added from the Course of "Pakistani Society and Culture", Course Code PST-421.
      ii. Add the "Recommended Books" as per the directions given in the 12th Board of Faculty meeting.

iv. All the other courses from the categories of Art and Humanities, Social Sciences and Natural Sciences were discussed and recommended to the Syndicate for approval.

2. **Recommendation made by Board of Faculties (Faculty of Sciences & Social Sciences)**

AGENDA FOR THE MEETING OF BOARD OF FACULTIES OF SCIENCES & SOCIAL SCIENCES – GENERAL EDUCATION (GEN-ED) REQUIREMENTS (MANDATORY COURSES FOR ALL DEPARTMENTS)

Decision:

1. The Board of Faculties of Sciences and Social Sciences approved the Course Contents of the following General Education Mandatory Courses as per the approval status. These courses shall be offered in all BS Programs.

General Education Mandatory Courses

S. No.	Department	Course Code	Course Title	Credit Hours	Approval Status
1	English	ENG-303	Functional English	3	Course designed by the department is approved
2		ENG-304	Expository Writing	3	
3	Mathematics	MTH-401	Quantitative Reasoning I	3	Adopt the course provided by HEC
4		MTH-402	Quantitative Reasoning II	3	
5	Islamiyat	ISL-301	Islamic Studies / Religious Education / Ethics (in lieu of Islamic Studies only for non-Muslim	2	- For Islamic Studies, adopt the course provided by HEC - For Religious Education, the task of

			students)		designing the course was assigned to Dr. Naseem Akhtar and Dr. Zainab Amin, Associate Professors, Department of Islamiyat - For Ethics, the course was already designed and shared by Dr. Farhat Amin
6	Pakistan Studies	PST-313	Ideology and Constitution of Pakistan	2	Adopt the course provided by HEC
7	Computer Science	CSC-308	Application of Information and Communication Technologies	3(2+1)	
8	Management Science	MS-309	Introduction to Entrepreneurship	2	
9	Political Science	PSC-418	Civics and Community Engagement	2	

2. The Board further decided the following:
   a. In order to familiarize the students with the concept of Art and Humanities, a course may be designed for the category of Arts and Humanities which shall encompass the components from the disciplines of art and design, history, philosophy, Pakistani Society and Culture, literature and linguistics etc. In this lieu, a committee was constituted by the Dean of Faculties, comprising the following faculty members from the Discipline of Arts & Humanities who shall design the said course.
      i. Dr. Sadaf Bashir. Associate Professor. Department of Political Science
      ii. Ms. Sadia Nazeer. Assistant Professor. Department of English
      iii. Ms. Saima Naseer. Assistant Professor Department of Art and Design
      iv. Dr. Hamida Bibi. Assistant Professor. Department of History and Pakistan Studies
   b. It was further suggested that the same Course shall be affixed with the Code AH-301 for the domain of Arts and Humanities.
3. The Board further decided to design courses of similar nature for the categories of Natural Sciences and Social Sciences.

sd/-
Assistant Registrar Academics

No: 1992-96/Acad/SBBWUP

Copy to:
1. Chairpersons/ Incharges of all the teaching Department, SBBWUP
2. Controller of Examinations, SBBWUP
3. BS Coordinators, SBBWUP
4. PS to Vice Chancellor, SBBWUP
5. PA to Registrar, SBBWUP

Assistant Registrar Academics

Revised as per HEC New UEP 2023

SHAHEED BENAZIR BHUTTO WOMEN UNIVERSITY PESHAWAR

AGENDA FOR THE MEETING OF THE 19th ACADEMIC COUNCIL 8th November 2023.

General Education (Gen Ed) Requirements

(Mandatory Courses for All Departments)

SHAHEED BENAZIR BHUTTO WOMEN UNIVERSITY PESHAWAR

Curriculum Revamp Committee

Dr.Farhat Amin. Associate Professor
Department of Bioinformatics, SBBWU
(Convener)

Ms.Sadia Nazeer (Member)
Assistant Professor
Department of English. SBBWU

Dr. Soofia Iftikhar (Member)
Assistant Professor
Department of Statistics, SBBWU

Dr. Samra Kiran (Member)
Assistant Professor
Department of Management Science, SBBWU

Dr. Rehana Masood (Member)
Assistant Professor
Department of Biochemistry, SBBWU

Ms.Mehwish Asmat Ullah (Member)
Deputy Director.
Quality Enhancement Cell, SBBWU

Ms.Tashfeen Zia (Member)
Deputy Director.
Affiliation and Monitoring, SBBWU

Dr.Rubi Bilal (Secretary)
Controller of Examinations, SBBWU

Dr.Safia Ahmed (T.I)
Dean Faculty of Sciences & Social Science,
SBBWU

Approval of General Education (Gen Ed) Requirement as per HEC New UEP 2023

Gen Edu Mandatory Course				
S.No	**Department**	**Course Code**	**Course Title**	**Cr.Hrs**
1	**English**	ENG-303	Functional English	3
2		ENG-304	Expository Writing	3
3	**Maths**	MTH-401	Quantitative Reasoning, I	3
4		MTH-402	Quantitative Reasoning, II	3
5	**Islamiyath**	ISL-301	Islamic Studies (OR)	2
		ISL-315	Religious Education in lieu of Islamic Studies only for non-Muslim students	
		ETH-301	Ethics in lieu of Islamic Studies only for non-Muslim students	
6	**Pakistan Studies**	PST-313	Ideology and Constitution of Pakistan	2
7	**Computer Science**	CSC-308	Application of Information and Communication Technologies	3(2+1)
8	**Management Science**	MS-309	Introduction to Entrepreneurship	2
9	**Political Science**	PSC-418	Civics and Community Engagement	2
10		AH-301	**Arts & Humanities**	2
			Courses of Arts & Humanities	
i.	**Art & Design**	AD- 304	Foundation Design	2
ii.		AD-305	Basics of Art	2
iii.		AD- 318	Photography Techniques & Practice	2
iv		ADC-406	Basic Visual Design	2
v	**Pakistan Studies**	PST-324	Climate change and cultural heritage of Pakistan	2
vi		PST-325	Climate Change and the National Security of Pakistan	2
Vii	**History**	HIS-302	A Survey Course of World Civilizations	2
Viii		HIS-313	Revolutionary Moments in History	2
Ix		HIS-314	History of Religions: A Case Study of South Asia	2
X	**English**	ENG-305	Introduction to Linguistics	2
xi		ENG-306	Introduction to English Literature	2
xii	**Islamiyat**	ISL-302	Arabic Language	2
11			**Courses of Social Sciences**	2

i	**Economics.**	ECO-301	Introduction to Economics	2
ii		ECO-306	Economy of Pakistan	2
iii	**Psychology**	PSY- 301	Understanding Psychology	2
vi.	**Management Sciences**	MS-307	Essential of Management	2
v		MS-308	Basics of Human Resource Management	2
vi		MS-413	Introduction to Islamic Finance	2
12			**Natural Sciences**	**3**
i	**Biochemistry**	BCHM-402	General Biochemistry	3
ii	**Bioinformatics**	BI-401	Introduction to Bioinformatics	3
iii		BI-409	Fundamentals of Bioinformatics	3
iv	**Biotechnology.**	BIT- 414	Climate Change and Human Health	3
v		BIT-682	Pharmacology	3
Vi		BIT-402	Biosafety and Bioethics	3
Vii	**Botany**	BOT-305	Introduction to Biology	3
Viii		BOT-306	General Botany	3
Ix	**Chemistry**	CHM-402	Environmental Chemistry	3
x		CHM-300	General Chemistry	3
Xi	**Food and Nutrition**	HND-512	Nutritional Psychology	3
Xii		FST-623	Food Chemistry	3
Xiii		HND-521	Sports Nutrition	3
Xiv	**Statistics**	STAT-304	Basic Statistics	3
xv		STAT-402	Probability and Statistics	3
Xvi	**Zoology**	ZOL-301	General Science	3
Xvii		ZOL-302	Biodiversity of Animal Life	3
xviii		ZOL-401	Essentials of Biology	3

1. Functional English

Course Title:: Functional English	**Course Code: ENG-303**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: None	
Course Objective: This course will familiarize students with the essential language skills for effective communication in diverse real-world scenarios. It focuses on developing proficiency in English language and usage: word choices, grammar and sentence structure. In addition, the course will enable students to grasp subtle messages and tailor their communication effectively through the application of comprehension and analytical skills in listening and reading. Moreover, the course encompasses a range of practical communication aspects including professional writing, public speaking and everyday conversation ensuring that students are equipped for both academic and professional spheres.	

Course Outline: 1. Foundations of Functional English Vocabulary Building (contextual usage, synonyms, antonyms, and idiomatic expressions) Communicative Grammar (subject-verb agreement, verb tenses, fragments, run-ons, modifiers, articles, word classes etc) Word Formation (affixation, compounding, clipping, back formation etc) Sentence Structure (simple, compound, complex and compound-complex). **Comprehension and Analysis.3.** Understanding Purpose, audience and context a. (reading for meaning, descriptive texts versus narrative texts , argumentative texts versus persuasive texts) 3. Contextual Interpretation (tones, biases, stereotypes, assumptions, inferences etc) 4. Reading Strategies (skimming, scanning, SQ4R, critical reading) 5. Active Listening (overcoming listening barriers, focused listening). **Effective Communication** Principles of Communication(clarity, coherence, correctness and courteousness). Structuring Documents (introduction, body, conclusion and formatting). Inclusivity in Communication (gender-neutral language and cross-culturalcommunication). Public Speaking (Speech/presentation: extemporaneous and prepared, public announcements and overcoming stage fright) Presentation Skills: a. (the elements of an effective presentation, using visual displays to present key facts, figures, charts, and graphs , steps to preparing an effective presentation, one-minute presentations and evaluate presentations, Informal Communication (small talk and networking), Professional Writing (business e-mails, memos, reports, formal letters etc).
Course Outcomes: By the end of the course the students will be able to apply the enhanced English skills, comprehend a variety of literary and non-literary texts, and express effectively in spoken and written English in diverse social and cultural contexts.
Recommended Books: Latest Edition of Following Books 1. Murphy, Raymond. Grammar in Use Intermediate Student's Book without Answers. Cambridge University Press, 2018. 2. Kaufman, Lester, and Jane Straus. The Blue Book of Grammar and Punctuation. 2021. 3. Axelrod, Rise B., and Charles R. Cooper. The St. Martin's Guide to Writing [with Access Code]. 2016. 4. 2. Johnson-Sheehan, Richard, and Charles Paine. Writing Today. Pearson, 2019. **5.** https://www.hec.gov.pk/english/services/universities/RevisedCurricula/Documents/2011-2012/Education/English2_Sept13.pdf

2. Expository Writing

Course Title:: Expository Writing	**Course Code: ENG-304**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: None	
Course Objective: This is a sequential undergraduate course aimed at refining basic writing skills in various contexts. Building upon its pre-requisite, Functional English Course, this course will enhance student's ability to produce clear, concise and coherent texts in English. This course will enable the students to produce well-structured essays and to refine their analytical skills.	
Course Outline: 1. **Introduction to Expository Writing** Definition, Types, Characteristics (clarity, coherence &	

organization) **2. The Writing Process** Pre-writing Techniques (brainstorming, free-writing, mind-mapping, outlining), Drafting, Revising and Editing, Proof reading, Peer review and Feedback3. **Essay organization and Structure** Introduction, Thesis statement, Body paragraphs, Conclusion, Cohesion & Coherence **4. Different Types of Expository Writing** Description, Illustration, Classification, Cause and Effect, Process analysis, Comparative analysis **9. Writing for Different Purposes and Audiences** Types of purposes (to inform, to analyze, to persuade, to entertain etc), Writing for Academic Audiences, Writing for Public Audiences, Different tones and styles **Ethical Considerations** Plagiarism and Originality, Citation and Referencing
Course Outcomes: By the end of the course, the students will be able to; 1. Understand the essentials of the writing process (pre-writing, drafting, editing, proof reading etc) 2. Demonstrate mastery of diverse expository types **3.** Uphold ethical practices to maintain originality in expository writing
Recommended Books: Latest Edition of Following Books. 1. Axelrod, Rise B. and Charles Raymond Cooper. The Concise St. Martin's Guide to Writing. Bedford/ St. Martins, 2015. 2. Johnson-Sheehan, Richard, and Charles Paine. Writing Today. Pearson, 2019. 3. Murphy, Raymond. Grammar in Use Intermediate Student's Book without Answers. Cambridge University Press, 2018.

3. Quantitative Reasoning, I

Course Title: Quantitative Reasoning-I	**Course Code: MTH-401**
Course Structure: Lectures:3	**Credit Hours:** 3
Prerequisites:	
Course Objectives • Quantitative reasoning (I) as in introductory-level undergraduate course that focuses on the fundamentals related to the quantitative concept and analysis. • The course is designed to familiarize students with the basic concepts of mathematics and statistics and to develop students' ability to analyze and interpret quantitative information. Through a combination of theoretical concepts and practical exercises • This course will also enable students cultivate their quantitative literacy and problem-solving skills while effectively expending their academic horizon and breadth of knowledge of their specific major/field of study.	
Course Outline: 1. Numerical Literacy : Number system and basic arithmetic operation; Units and their conversion, dimension, area, parameter, and volume;Rates, ratio, proportion, and percentage; Types and sources of data; Measurement scales; Table and graphical presentation of data; Quantitative reasoning exercises using number knowledge;**2.Fundamental Mathematical Concept:**Basic of geometry (lines, angles, circles, polygons etc); Sets and their operations; Relations, functions, and their graphs;Exponent, factoring and simplifying algebraic expression; Algebraic and graphical solutions of linear and quadratic equations and inequalities;Quantitative reasoning exercises using fundamental mathematical concepts;**3. Fundamental Statistical Concepts:**Population and sample; Measure of central tendency, dispersion and data interpretation; Rules of counting (multiplicative, permutation, and combination);Basic probability theory; Introduction to random variables and their probability distribution;Quantitative reasoning exercises	

using fundamental statistical concept;

Course Outcomes By the end of this course, student shall have:

- Fundamental numerical litracy to enable them work with munbers understand their meaning and present data accurately;
- Understanding of fundamental mathematical and statistical concept;
- Basic ability to interpret data presented and various format including but not limited to tables, graphs, charts, and equations etc.

Recommended Books:

1. "Quantitative Reasoning: Tools for Todays Informs Citizen" by Bernard L. Madison. Lynn and Arthur Steen
2. "Quantitative Reasoning for the Information Age" by Bernard L. Madison. And David M. Bressoud.
3. "Fundamental of Mathematics" by Wade Ellis.
4. "Quantitative Reasoning: Thinking and Numbers" by Eric Zaslow.
5. "Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis" by Ethan Bueno De Mesquita and Anthony Fowler.
6. "Using and Understanding Mathematics: A Quantitative Reasoning Approach" by Bennett, J. O., Briggs, W. L., & Badalamenti, A.
7. "Decreet Mathematics and Its Application" by Kenneth H. Rosen.
8. "Statistics for Technologies: A Course in Applied Statistics" by Chatfield, C.
9. "Statistics: Unlocking the Power of Data" by Robin H. Lock, Patti Farzer Lock, Kari Lock, Morgan and Eric F. Lock.

4. Quantitative Reasoning, II

Course Title: Quantitative Reasoning II	**Course Code: MTH-402**
Course Structure: Lectures:3	**Credit Hours:** 3
Prerequisites:	

Specific Objectives of Course

Quantitative reasoning (II) is a sequential undergraduate course that focuses on logical reasoning supported with mathematical and statistical concepts and modelling/analysis technique to equip student with analytical skills and crtitical thinking abilities necessary to navigate the complexities of the modern world. The course is design to familiarize students with the quantitative concept and technique require to interpret and analyze numerical data to inculcate and ability in students the logical reasoning to construct and evaluate arguments, identify fallacies, and think systematically. Keeping the prerequisite course of quantitative reasoning I and its base, this course will enable students further their quantitative, logical and critical reasoning abilities to complement their specific major/field of study.

Course Outline:

1. Logic and Logical Critical Reasoning Introduction and Importance of logic;Inductive, deductive, and abductive approaches of reasoning;Prepositions, arguments (valid; invalid), logical connectives, truth tables and prepositional equivalences;Logical fallacies;Venn diagram;Predicates and quantifiers, Quantitative reasoning exercises using logical reasoning concepts and techniques; **2.Mathematical Modelling and Analysis,** Introduction to deterministic models, Use of linear functions for modelling in real world situations;Modelling with system of linear equation and their solutions;Elementary introduction to derivatives and mathematical modelling;Linear and exponential growth and decay models;Quantitative reasoning exercises using mathematical modelling;**3. Statistical Modelling and Analysis:** Introduction to probabilistic models;Bivariate analysis, scatter plots;Simple linear regression model and correlation analysis; Basics of estimation and confidence interval;Testing of hypothesis (Z-test; T-test);Statistical inference in decision making;Quantitative reasoning exercises and using statistical modelling;

Course Outcomes

By the end of this course, student shall have:

- Understanding of logic and logical reasoning;
- Understanding of basics quantitative modelling and analysis;
- Logical reasoning skills and abilities to apply them to solve quantitative problems and evaluate arguments;
- Ability to critically evaluate quantitative information to make evidence based decisions through appropriate computational tools:

Recommended Books:

1. "Using and Understanding: A Quantitative Reasoning Approach" by Bennett, J.O., Biggs, W. L., and Badalamenti, A.
2."Discrete Mathematics and Its Applications" by Kenneth H. Rosen.
3."Discrete Mathematics with Applications" by Susanna S. Epp.
4."Applied Mathematics for Business, Economics, and Social Sciences" by Frank S. Budnick.
5."Elementary Statistics: A Step by Step Approach" by Allan Bluman.
6."Introductory Statistics" by Prem S. Mann.
7."Applied Statistical Modelling" by Salvatore Babones.
8."Barrons SAT" by Sharvonweiner Green, M. A and Lra K. Wolf.

5. Islamic Studies

Course Title:: Islamic Studies	**Course Code:Isl-301**
Course Structure: Lectures	**Credit Hours: 2**
Prerequisites: None	

Description This course is designed to provide students with a comprehensive overview of the fundamental aspect of Islam, its beliefs practices History and influence on society. It will further familiarize the students with a solid foundation in understanding Islam from an academic and cultural perspective. Through this course students will have and enhanced understating of Islam's multifaceted dimensions which will enable them to navigate complex discussions about Islam's Historical and contemporary role fostering empathy respect and informed dialogue .

Course outcomes : By the end of this course, Students will be able to :

1. Demonstrate enhanced knowledge of Islamic foundational beliefs, practices historical development spiritual values and ethical principles
2. Describe basic source of Islamic law and their application in daily life
3. Identify and discuss contemporary issue being faced by the Muslims world including social challenges, gender role and interfaith interactions.

Course outline: Introduction to Islam: Definition of Islam and its core beliefs The Holy Qura'n (Introduction, Revelation and compilation, Hadith and Sunnah (Compilation Classification and Significance) Key theological concepts and themes (Tawhid , Prophet hood Akhiraha etc, **Seerat of Holy Prophet (S.A.W)** Life and legacy of the Holy prophet **(S.A.W** Diverse role of the Holy Prophet (as and individual, educator, peace maker, leader etc**), Islamic History and civilization** World Before Islam Rashidun Caliphate and expansion of Islamic rule, Contribution of Muslim scientists and philosophers in shaping world civilization,

Islamic Jurisprudence: (Fiqh) Fundamental Sources of Islamic Jurisprudence Pillars of Islam and their significance Major Schools of Islamic Jurisprudence **,** Significance and principles of Ijtihad, **Family and Society in Islam** Status and rights of woman in Islamic Teachings, Marriage, Family, and gender roles in Muslim society, Family structure and values Muslim society, **I**slam & the Modern World.

Suggested Instructional Materials

1. The five Pillars of Islam: A journey thought the Divene Acts of Worship by Muhammad Mustafa Al Azami
2. The Five Pillars of Islam: A Framework for Islamic Values and Character Building by Musharraif Hussain
3. Towards Understanding Islam By Abul A' la Mawdudi
4. Islami Nazria e Hayat by Khurshid Ahmad
5. An Introduction to Islamic theology by John Rearard
6. Islamic Civilization Foundations Belief and Principles by Abul A la Mawdudi
7. Women and Social Justices An Islamic Paradigm by Dr Anis Ahmad
8. Islam its Meaning and Message " By Khushid Ahmad

6. Religious Education

Course Title: Religious Education	**Course Code: ISL-315**
Course Structure: Lectures: 2	**Credit Hours: 2**
Prerequisites:	
Course Objective: The objective of this course is to impart to the students an understanding of the basic ideas behind Religious Studies. It provides a comprehensive understanding of several religions and addresses their beliefs, status in history, customs, ethics, tolerance, harmony, and social roles. Students will get further information and a comprehensive understanding of religion's nature and impact on people and societies via this course. 1. To inform about the beliefs and teachings of well-known religions. 2. To familiarize with the leaders of different religions and religious books. 3. To study the teachings regarding beliefs, historical status, practices, ethics, tolerance, peace in different religions and the role of religion in society.	
Course Outline: 1. Religion and Deen: Meaning, Definition, Synonyms, Necessity and Importance, Evolutionary and Inspired Theory of Religions, 2. The Significance of Ethics, Literal and Terminological Meaning of Ethics, The Need for Ethics in Religious Tolerance, 3. Buddhism, Initiation and Development, Basic Introduction and History, Introduction to Basic Literature, Introduction to Basic Teachings.4. Judaism, Introduction and History of Judaism, Religious Literature of Judaism (Introduction to the Bible), Jewish Beliefs and Worships, The Moral Teachings of Judaism. 5. Confucianism, i. Initiation and Development, ii. Basic introduction and History, iii. Introduction to Basic Books, iv. Introduction to Basic Teachings, 6. Christianity i. Introduction and History of Christianity ii. Introduction to the Gospels, iii. Moral Teachings of Christianity iv. Study of society (Social Studies) 7. Hinduism, i. Initiation, Development and Introduction, ii. Social and Reform Movements in Hinduism.iii. Introduction to Basic Books, iv. Introduction to Basic Education, 8. Islam, i. Initiation, Development and Introduction, ii. Study of the Biography of Seerat-e-Tayyaba صلی اللہ علیہ وسلم, iii. Islamic Teachings and Morals, iv. Islam is a Complete Code of Life.9. Zoroaster, i. Introduction and History of Zoroastrianism, ii. Zoroastrian Religious Literature / Zoroastrian Method of Worship,iii. Preaching and Territories,10. Sikhism i. Initiation and Development, ii. Basic introduction and History, iii. Introduction to Basic Books, iv. Introduction to Basic Teachings.	
Course Outcomes:	
Recommended Books: Latest Edition of the Following Books.	

تفصیل نصابی کتب

نمبر شمار	نام مصنف	نام کتاب	پبلشر، مقام اشاعت، سن اشاعت
1	احمد دیدات، شیخ	تقابل الادیان السماویۃ (یہودیت، عیسائیت اور اسلام)	لاہور، عبداللہ اکیڈمی، 2010ء (ترجمہ مصباح اکرم)
2	فاروقی عماد الحسن، آزاد	دنیا کے بڑے مذاہب	مکتبہ تعمیر انسانیت۔ لاہور
3	رانا احسان الحق، ڈاکٹر	یہودیت و مسیحیت (مذاہب اہل کتاب کی حیثیت)	مسلم اکیڈمی، 1981ء (محمد نگر علامہ اقبال روڈ لاہور)
4	Dr. Muhammad Iqbal	Reconstruction of Religious Thought in Islam	Muhammad Ashraf, Lahore, 1990
5	Mayer, H.D.A	Civilization and Religious Values	London, George Allen and Union, 1995
6	Mex Weber	The Sinology of Religion	Beacon Press, Boston, 1970

7. Ethics (For non-Muslim students)

Course Title: Ethics	**Course Code: ETH-301**
Course Structure: Lectures: 2	**Credit Hours: 2**

Course Objective: This course aims

i. To equip students with a strong foundation in ethics and an appreciation for its relevance in diverse cultural, religious, and social contexts.

ii. To apply ethical principles to their own lives, professions, and interactions with people from different backgrounds.

iii. To analyze and compare ethical teachings and values in major world religions, promoting intercultural understanding.

Course Outline: Definition of Ethics, Different concepts of Ethics: (Ancient and contemporary), Relations to Philosophy, Utilitarianism, and its implications. **Types of Ethics** a. Good Ethics b. Bad Ethics, **Importance of Ethics in Human Life:** a. Individual Life, b. Family Life. c. Social Life. d. Importance of Ethics in Economic Life. e. Importance of Ethics in Politics. f. Importance of Ethics in Relation to Environment. g. Cultural Relativism and Ethics.**Ethical Teachings and Values in Different Religions:** a. Hinduism, b. Buddhism, c. Zoroastrianism, d. Christianity, e. Judaism, f. Islam,g. Sikhism. **Ethical Values of the above Religions:** a. Truthfulness, b. Trustworthiness, c. Service to Humanity, d. Tolerance, Endurance, e. Respect for others, f. Cooperation, Mutual Help, selflessness, g. Justice (Social Justice, Economic Justice), h. Equality, **Concept of virtue and Evil in**

different religions. Concept of "Flah" in Different Religions.Interfaith Relations. War and Ethical Principles. Work Ethics.
Course Outcomes: Upon completion of the course, students should be able to: i. Recognize the importance of ethics in various aspects of life, including individual, family, social, economic, political, and environmental contexts. ii. Compare and contrast ethical teachings and values in different religions, Identify and explain the ethical values upheld by specific religions, including truthfulness, trustworthiness, and justice. iii. Foster an understanding of interfaith relations and the significance of tolerance and cooperation among diverse religious groups.
Recommended Books: Latest Edition of the Following Books. 1. Benjamin Hale, Andrew Light, Lydia Lawhon. (2022). The Routledge Companion to Environmental Ethics (Ed.). Routledge. 2. Kieran Setiya, Life Is Hard: How Philosophy Can Help Us Find Our Way. (2022) Penguin Publishing Group, 3. Russ Shafer-Landau, The Fundamentals of Ethics 5th Edition (2020). Oxford University Press. 4. Paul Bloomfield, The Oxford Handbook of Moral Realism. (2023)Oxford University. 5. William B. Irvine A Guide to the Good Life: The Ancient Art of Stoic Joy 1st Edition. (2008) 6. J.S. Mackenzie, A Manual of Ethics 7. Harold H.Titus, Ethics for Today 8. B. A. Dar. Quranic Ethics. (1970). Orientalia Art Ltd. 9. Hamidullah, M. Introduction to Islam. 2004. Idara-e-Islam. 10. Ameer Ali Syed, The Spirit of Islam 11. Mackenzie. J. S. Manual of Ethics (Classic Reprint). (2017). Fb&c Limited. 12. Singer, P. (Ed.), A Companion to Ethics (2000). Wiley-Blackwell. 13. Syed, A. A. The spirit of Islam. (2019).Tawasul International. 14. Titus, H. H., & Keeton, M.T. (5th Ed.). Ethics for Today. (1973). Van Nostrand.

8. Ideology and Constitution of Pakistan

Course Title: Ideology and Constitution of Pakistan	**Course Code: PST-313**
Course Structure: Lectures: 2	**Credit Hours: 2**
Prerequisites:	
Course Objective: This course is designed to provide students with a fundamental exploration of the ideology and the constitution of Pakistan. The course focuses on the underlying principles, beliefs, and aspirations that have been instrumental in shaping the creation and development of Pakistan. Moreover, the course will enable students to understand the core provisions of the Constitution of the Islamic Republic of Pakistan concerning the fundamental rights and responsibilities of Pakistani citizens to enable them to function in a socially responsible manner.	
Course Outline: 1. Introduction to the Ideology of Pakistan: Definition and significance of ideology. Historical context of the creation of Pakistan(with emphasis on socio-political.religious, and cultural dynamics of British India between 1857 til 1947). Contributions of founding fathers of	

Pakistan in the freedom movement including but not limited to Allama Muhammad Iqbal,Muhammad Ali Jinnah.,etc. .Contributions of women and students in the freedom movement for separate homeland for Muslims of British India. **2. Two-Nation Theory:** Evolution of the Two-Nation Theor(Urdu-Hindi controversy,Partition of Bengal,Simla Deputation 1906,Allama lqbal's Presidential Address 1930,Congress Ministries 1937, Lahore Resolution 1940). Role of communalism and religious differences. **3. Introduction to the Constitution of Pakistan**. Definition and importance of a constitution. ldeological factors that shaped the Constitution(s) of Pakistan (Objectives Resolution 1949). Overvicw of constitutional developments in Pakistan. **4. Constitution and State Structure:** Structure of Ciovernment(executive,legislature,and judiciary). Distribution of powers between federal and provincial governments. 18th Amendment and its impact on federalism.**5. Fundamental Rights,Principles of Policy and Responsibilities:** Overview of fundamental rights guaranteed to citizens by the Constitution of Pakistan 1973 (Articles 8-28). Overview of Principles of Policy (Articles 29-40). Responsibilities of the Pakistani citizens (Article 5). **6. Constitutional Amendments:** Procedures for amending the Constitution. Notable constitutional amendments and their implications.

Course Outcomes: By the end of this course, students will be able to:

1. Demonstrate enhanced knowledge of the basis of the ideology of Pakistan with special reference to the contributions of the founding fathers of Pakistan.
2. Demonstrate fundamental knowledge about the Constitution of Pakistan 1973 and its evolution with special reference to state structure.
3. Explain about the guiding principles on rights and responsibilities of Pakistani citizens as enshrined in the Constitution of Pakistan 1973.

Recommended Books: Latest Edition of the Following Books.

1. "The ldea of Pakistan" by Stephen P.Cohen.
2. "ldeology of Pakistan" by Javed lqbal.
3. “The Struggle for Pakistan”by l.H.Qureshi.
4. "Pakistan the Fornmative Phase"by Khalid Bin Sayeed.
5. "Pakistan:Political Rots and Development"”by Safdar Mahmood.
6. "ldeology of Pakistan"”by Sharif-ul-Mujahid.
7. "The Struggle for Pakistan:A Muslim Homeland and Global Politics" by Ayesha Jalal.
8. "Jinnah,Pakistan and Islamic Identity:The Search for Saladin" by Akbar S.Ahmed.
9. "The Making of Pakistan:A Study in Nationalism" by K.K.Aziz.
10. "Pakistan:A New History” by lan Talbot.
11. "Pakistan in the Twentieth Century:A Political History" by Lawrence Ziring.
12. "The Constitution of Pakistan 1973”.Original.
13. "Constitutional and Political Development of Pakistan”by Hamid Khan.
14. "The Parliament of Pakistan” by Mahboob Hussain.
15. "Constitutional Development in Pakistan" by G.W.Choudhury.
16. "Constitution-Making in Pakistan:The Dynamics of Political Order" by G.W.Choudhury.

9. Application of Information and Communication Technologies

Course Title: Applications of Information and Communication Technologies	**Course Code: CSC-308**
Course Structure: Lectures: 2 Lab:1	**Credit Hours: 3**
Prerequisites: None	

Course Objective:

- This course is designed to provide students with an exploration of the practical applications of Information and Communication Technologies (ICT) and software tools in various domains.
- Students will gain hands-on experience with a range of software applications, learning how to leverage ICT to solve daily life problems, enhance productivity and innovate in different fields.
- Through individual and interactive exercises and discussions, students will develop proficiency in utilizing software for communication, creativity, and more.

Course Outline:

Introduction to Information and Communication Technologies: Components of Information and Communication Technologies (basics of hardware, software, ICT platforms, networks, local and cloud data storage etc.). Scope of Information and Communication Technologies (use of ICT in education, business, governance, healthcare, digital media and entertainment, etc.). Emerging technologies and future trends. **Basic ICT Productivity Tools:** Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web. Formal communication tools and etiquette (Gmail, Microsoft Outlook, etc.). Microsoft Office Suites (Word, Excel, PowerPoint).Google Workspace (Google Docs, Sheets, Slides).Dropbox (Cloud storage and file sharing), Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration). Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas). Video conferencing (Google Meet, Microsoft Teams, Zoom, etc.). Social Media applications (Linkedln, Facebook, Instagram, etc.). **ICT in Education:** Working with learning management systems (Moodle, Canvas, Google Classrooms, etc.).Sources of online education courses (Coursera, edX, Udemy, Khan Academy, etc.).Interactive multimedia and virtual classrooms. **ICT in Health and Well-being:** Health and fitness tracking devices and applications (Google Fit, Samsung Health, Apple Health, Xiaomi Mi Band, Runkccpcr, etc.).Telemedicine and online health consultations (OLADOC, Sehat Kahani, Marham, etc.).**ICT in Personal Finance and Shopping:** Online banking and financial management tools (JazzCash, Easypaisa, Zong PayMax, Il LINK and MNET, Keenu Wallet, etc.).E-commerce platforms (Daraz.pk, Telcnoart, Shophivc, etc.)Digital Citizenship and Online Etiquette. Digital identity and online reputation. Netiquette and respectful online communication. Cyberbullying and online harassment. **Ethical Considerations in Use of ICT Platforms and Tools:** Intellectual property and copyright issues. Ensuring originality in content creation by avoiding plagiarism and unauthorized use of in fornication sources. Content accuracy and integrity (ensuring that the content shared through ICT

platforms is free from misinformation, fake news, and manipulation).

Practical Requirements

As part of the overall learning requirements, the course will include guided tutorials and exercises to ensure that students are proficient in commonly used software applications such as worcl processing software (e.g., Microsoft Word), presentation software (e.g., Microsoft PowerPoint), spreadsheet software (e.g., Microsoft Excel) among such other tools. Students may be assigned practical tasks that require them to create documents, presentations, and spreadsheets etc. Assigning tasks that involve creating, managing, and organizing files and folders on both local and cloud storage systems. Students will practice file naming conventions, creating directories, and using cloud storage solutions (e.g., Google Drive, OneDrive). The use of online learning management systems (LMS) where students can access course materials, submit assignments, participate in discussion forums, and take quizzes or tests. This will provide students with the practical experience with online platforms commonly used in education and the workplace.

Course Outcomes:

- By the end of this course, students will be able to Explain the fundamental concepts, components, and scope of Information and Communication Technologies (ICT).
- Identify uses of various ICT platforms and tools for different purposes.
- Apply ICT platforms and tools for different purposes to address basic needs in different domains of daily, academic, and professional life.
- Understand the ethical and legal considerations in use of ICT platforms and tools.

Recommended Books: Latest Edition of the Following Books.

1. Vermaat, Shaffer, and Freund, Discovering Computers, 2017, Cengage Learning.
2. Series by Gaskin, Vargas, and McLellan, GO! with Microsoft Office,2013, Pearson.
3. Grauer and Poatsy. Exploring Microsoft Office,2016, Pearson.
4. Morley and Parker Computing Essentials, 2023, McGraw Hill.
5. Evans, Martin, and Poatsy. Technology in Action,2021, Pearson.

10. Introduction to Entrepreneurship

Course Title: Introduction to Entrepreneurship	**Course Code: MS-309**
Course Structure: Lectures:	**Credit Hours: 2**
Prerequisites:	

Course Objective:

This course is designed to promote entrepreneurial spirit and outlook among students, encouraging them to think critically, identify opportunities, and transform their ideas into successful ventures. It aims at imparting them with the requisite knowledge, skills, abilities, enabling them to seize theidentified opportunities for initiating ventures and successful navigating the challenges that come withstarting a business and managing it. The course covers topics relevant to entrepreneurship

including setting up and initiation of business, market research, opportunity identification, business planning, financial literacy for managing finances and securing funding, marketing and sales, team building and innovation.

Course Outline:

Introduction to Entrepreneurship, Entrepreneurial Skills, . Opportunity Recognition and Idea Generation, Opportunity identification, evaluation and exploitation, Innovative idea generation techniques for entrepreneurial ventures, Marketing and Sales, Financial Literacy, Team Building for Startups & Regulatory Requirements to Establish Enterprises in Pakista**n.**

Course Outcomes: Upon successful completion of the course participants will:

- Have a basic understanding of the Islamic World and Muslim beliefs.
- Know the origins of the Islamic Banking and Finance.
- Appreciate the rationale behind the development of the Islamic finance industry.
- Be able to assess the nature and scope of the Islamic finance industry in relation to its conventional counterpart.
- Develop an appropriate level of understanding of the main principles of Islamic banking and finance.
- Acquire essential knowledge about the key Islamic financial contracts, as used by the industry.
- Know about Murabaha and Musharaka contracts, Ijara and Istisna'a financing methods, as well as Salam and Takaful insurance.
- Be familiarized with the Islamic financial infrastructure, international financial institutions, and regulatory bodies.

Recommended Books:

1. Barringer, B. R., & Ireland, R. D. (2012). Entrepreneurship: Successfully Launching New Ventures. Pearson.
2. Kuratko, Donald F. (2017). Entrepreneurship : Theory, Process, Practice (ed.10). United State of America: Cengage Learning.
3. Timmons, J. A., & Spinelli, S. (2003). New venture creation/entrepreneurship for the 21st century. Singapore City: McGraw-Hill.
4. Abrams, R. (2017). Entrepreneurship: A Real-World Approach (2nd ed., illustrated). Planning Shop.
5. Read, S., Sarasvathy, S., Dew, N., & Wiltbank, R. (2016). Effectual Entrepreneurship (2nd ed.). Routledge. https://doi.org/10.4324/9781315684826
6. Ries, E. . (2011).The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.

11. Civics and Community Engagement

Course Title: Civics and Community Engagement.	**Course Code: PSC-418**
Course Structure: Lectures: 2	**Credit Hours: 2**
Prerequisites:	

Course Objective: This course is designed to provide students with fundamental knowledge about civics,citizenship,and community engagement.In this course,the students will learn about the essentials of civil society, government,civic responsibilities, inclusivity, and effective ways to participate in shaping the society which will help them apply theoretical knowledge to the real-world

situations to make a positive impact on their communities.

Course Outline:

1. Civics and Citizenship: Concepts of civics, citizenship, and civic engagement, Foundations of modern society and citizenship, Types of citizenship: active, participatory, digital, etc.**2. State, Government and Civil Society:** Structure and functions of government in Pakistan. The relationship between democracy and civil society. Right to vote and the importance of political participation and representation.**3. Rights and Responsibilities**: Overview of fundamental rights and liberties of citizens under the Constitution of Pakistan 1973. Civic responsibilities and duties. Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.) **4. Community Engagement:** ·Concept, nature, and characteristics of community. ·Community development and social cohesion. Approaches to effective community engagement. ·Case studies of successful community-driven initiatives.**5. Advocacy and Activism:** Public discourse and public opinion. Role of advocacy in addressing social issues. Social action movements. **6. Digital Citizenship and Technology:** The use of digital platforms for civic engagement Cyber ethics and responsible use of social media. Digital divides and disparities (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship.**7. Diversity,** Inclusion and Social Justice: Understanding diversity in society (ethnic, cultural,cconomic,political etc.). Youth, women and minorities' engagement in social development. Addressing social inequalities and injustices in Pakistan. Promoting inclusive citizenship and equal rights for societal harmony and peaceful co-existence.

Course Outcomes: By the end of this course, students will be able to:

1. Demonstrate fundamental understanding of civics, government, citizenship and civil society
2. Understand the concept of community and recognize the significance of community engagement for individuals and groups.
3. Recognize the importance of diversiy and inclusivity for societal harmony and peaceful co-existence.

Recommended Books: Latest Edition of the Following Books.

1. "Civics Today:Citizenship,Economics,&You" by McGraw-Hill Education.
2 "Citizenship in Diverse Societies" by Will Kymlicka and Wayne Norman.
3."E Fngaaina V Youth in Civic Life" by James Youniss an Peter Levine.
4. "Digital Citizenship in Action:Empowering Students to Engage in Online Com Kristen Mattson.
"Globalization and Citizenship:In the Pursuit of a Cosmopolitan Education" by Graham Pike and David Selby.
6. "Community Engagement:Principles,Strategies, and Practices" by Becky J.Feldpausch and Susan M.Omilian.
7. "Creating Social Change:A Blueprint for a Better World" by Matthew Clarke and Marie-Monique Steckel.

12. Arts & Humanities

Course Title: Art and Humanities	**Course Code: AH-301**
Course Structure: Lectures, 2 Hours	**Credit Hours: 2**

Course Objectives: This course is an interdisciplinary survey of human culture, society, and expression. The different disciplines in this course are organized into a series of broad thematic approaches focusing on aesthetics, literature**,** philosophy, history, society, and culture. This course will introduce students to each of these disciplines and some of the aspects and perspectives they take in the study of arts and humanities. The course develops knowledge and skills to understand the different disciplines of art and humanities, their scope, main categories, and their influence on human culture and expressions.

Course Outline: Introduction: What is humanities? Fields of art and humanities. **Art**: Introduction to Art, Art in the Indo-Pak subcontinent, Modern Art in Pakistan. **Literature & Linguistics**: Literature: Definition, Key Concepts, Major Genres. Linguistics: Definition, Key Concepts, Major Categories, **Philosophy:** Meaning and nature of Philosophy, Characteristics of Philosophy, Major area/branches of Philosophy, Metaphysics: Epistemology: Ethics /Moral Philosophy, Logic, Political Philosophy, Philosophy of Science. **History:** Meaning and concept, development of history in ancient, mid level and modern periods. Islamic concept of history .**Society & Culture:** Concept of Society and Culture**,** Pakistani Society: Social institutions (Family, school, religion, government, media)**,** Pakistani Culture: Norms and values; Similarities and difference to the main culture of Pakistan (Punjab, Khyber Pakhtunkhwa, Sindh, Balochistan, Gilgit Baltistan, Kashmir); Factors promoting national integration. Modernization and its impact on society.

Course Outcome: Upon successful completion of this course, students will be:

- Describe the different disciplines of art and humanities.
- Show awareness of the scope and variety of works in the arts and humanities.
- Demonstrate knowledge of the influence of arts, literature, history and philosophy on human culture and expressions.

Recommended Books:

1. Abbs, P. & Richardson, J. *The Forms of Poetry*. (1995). Cambridge University Press.
2. Axelrod, Rise B., and Charles R. Cooper. *The St. Martin's Guide to Writing [with Access Code]*. 2016.
3. Bose, S., & Jalal, A. *Modern South Asia: History, Culture, Political, Economy* (2nd Ed). 2004. Oxford University Press.
4. Chrisman, M., Pritchard, D., Fletcher, G., Mason, E, Lavelle, J. S., Massimi, M., Richmond, A., Ward, D. *Philosophy for Everyone* (2nd Ed.). (2016). Routledge.
5. Davis, H. *An Outline History of the World*.2022. Creative Media Partner.
6. Finch, G. *How to Study Linguistics: A Guide to Understanding Linguistics*. (2004). Palgrave.
7. Husain, M. *Aspects of Art*. 2000. Oxford University Press.
8. Jackson, F., & Smith, J. *The Oxford Handbook of Contemporary Philosophy*. (2005). Oxford University Press.
9. Qureshi, I. H. *The Pakistani Way of life*. (2016). New Royal *Book*.
10. Raza, R. Being Pakistani: Society, Culture and the Arts. (2018). HarperCollins India.

13. Foundation Design

Course Title:: Foundation Design	**Course Code:** AD- 304
Course Structure: Lectures: 0, Labs: 2	**Credit Hours:** 2(0,2)
Prerequisites: None	
Course Objective: • The basic design and color theory course • explores graphic communication through the understanding of elements and principles of design, as well as the design process, including idea development through final execution. • Students explore, identify and basic visual design principles and elements. • Introduces students to the elements and principles of visual *design*. Includes line, shape, space, value, texture, volume and color. • Concept development processes and material manipulation are used in combination with design principles to create effective and appropriate visual compositions.	
Course Outline: Introduction to design, Introduction to elements of art. (line, shape, value, texture, color) line, patterns through design. Shape: Pattern through shape.Monochromatic compositions.Composition(Logical/ Illogical &confused/ clear),Stylization of alphabets.Textures& Impressions, Creating a composition using value chart, Perspective., Creating focal point in a composition.,Paper collage, Illustration, Creating a poster design, Mini booklet of textures., Creating 3D art work	
Recommended Books: • Aspects of Art An Essential Textbook for Students of Art in Pakistan By Marjorie Husain • Illustrated Elements of Art and Principles of Design. by Consultant: Gerald F. Brommer • Art Is Fundamental: Teaching the Elements and Principles of Art in Elementary School by Eileen S. Prince	

14. Basics of Art

Course Title:: Basics of Art	**Course Code:** AD- 305
Course Structure: Lectures: 1, Labs: 1	**Credit Hours:** 2(1,1)
Prerequisites: None	
Course Objective: • It is a manual course where art material techniques and its application and its forms will be taught This knowledge is imperative for an art and design student to gain technical know-how for working in various art medium. • Students will further recognize and evaluate basic elements of design and Principal of design. Famous artists will be taught to the students for better visualization of paintings and art work.	
Course Outline: Introduction to Elements of Art, Line, Shape & Volume and Form types and its uses, Value and Color, Space & Texture, Principles of Art, Balance & Contrast, Emphasis & Movement, Pattern & Rhythm, Unity/Variety , Mediums and Artists,,Graphit Pencil, Charcoal , Pastels, Watercolors ,Oil Painting ,Acrylics, Pen and Ink.	

Recommended Books:

- Aspects of Art An Essential Textbook for Students of Art in Pakistan By Marjorie Husain
- Illustrated Elements of Art and Principles of Design. by Consultant: Gerald F. Brommer
- Art Is Fundamental: Teaching the Elements and Principles of Art in Elementary School by Eileen S. Prince

15. Photography Techniques & Practice

Course Title:: Photography Techniques& Practice	**Course Code:** AD- 318
Course Structure: Lectures: 1, Labs: 1	**Credit Hours**: 2(1,1)
Prerequisites: None	

Course Objective:

- Understanding of the visual forms and their aesthetic functions, and basic design principles.
- attention to such areas as design, color, and lighting.
- Knowledge and skills in the use of basic tools, techniques, technologies, and processes sufficient to work from concept to finished product.
- involves a mastery of the materials, equipment, and processes of the discipline, including but not limited to uses of cameras, film, lighting/digital technologies, processing in black and white, and color, and printing.
- An understanding of the industrial and commercial applications of photographic techniques.

Course Outline: Technical Introduction to Manual Camera & History of Photography, Camera Handling and Operation, Focus and Depth of Field, Exposure: aperture, shutter speed, ISO, Exposure Modes, 7 Seven basic elements of photography, Rules of Composition in photography, Perspective using basic elements, Concept compositions in Photography, Framing, Backgrounds, Photo Shoot, Subject and their Backgrounds: Urban Landscapes, Portrait Photography, Exposure photography: motion photography, Outdoor photography and camera setting: landscapes, Motion capture photography through shutter Speed, Metering (panning shot), Use of Lenses, Product Photography, Review and critique, Architectural, Thematic & Artistic Photography

Recommended Books:

- The Manual of Photography by Ralph E Jacobson, Siddney F Ray and Geoffrey G Attridge – Focal Press.
- Basic Photography. M. Langford (Focal Press, London, 1986).
- The Focal Encyclopedia of Photography. (Macmillan, New York, 1969).
- Life Library of Photography ‘The Camera’ by the Editors of Time-Life Books.
- Complete Digital Photography by Ben Long.
- Langford's Basic Photography: The guide for serious photographers by Michael Langford, Anna Fox.
- LIFE Guide to Digital Photography: Everything You Need to Shoot Like Pros by Joe McNally, Editors of Life.
- Understanding Exposure, 3rd Edition: How to Shoot Great Photographs with Any Camera by Bryan Peterson.

16. Basic Visual Design

Course Title:: Basic Visual Design	**Course Code:** ADC-406
Course Structure: Lectures: 0, Labs: 2	**Credit Hours:** 2
Prerequisites: None	
Course Objective: The course will give stress on the importance of visuals in communication design through practical assignment in traditional method and history of graphic design. Through a combination of theory and hands-on practical exercises, students will develop a solid foundation in design concepts, software tools, and critical thinking to produce visually compelling designs.	
Course Outline: 1. Understanding elements and principles of organization will be studied according to print media and social media, Both traditional and digital medium will be used for design, Introduction to history of design, Introduction to Software, Implementation of Design principals through design elements	
Recommended Books: Latest Edition of Following Books • Lissitzky, El. "Our Book." In El Lissitzky: Life, Letters, Texts. Edited by SopieLissitzky-Küppers. Translated by Helene Aldwinckle. London: Thames and Hudson, 1968, 356–359. • Lupton, Ellen and J. Abbott Miller, eds. The ABC's of Triangle, Square, Circle: The Bauhaus and Design Theory. New York: Princeton Architectural Press, 2000. • Airey, David. Logo Design Love: A Guide to Creating Iconic Brand Identities. New Riders; 1st edition. 2009. • Albers, Josef. Interaction of Color: Revised and Expanded Edition. Yale University Press; Rev Exp. Edition. 2006. • Bierut, Michael. Seventy-nine Short Essays on Design. Princeton Architectural Press; Reprint edition. 2012	

17. Climate change and cultural heritage of Pakistan

Course Title:: Climate change and cultural heritage of Pakistan	**Course Code: PST-324**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 02**
Prerequisites:	
Course Objective: This course aims at providing knowledge about the phenomenon of climate change in multidimensional perspectives. It uses critical approach to global, regional and local issues due to climate change on cultural heritage sites of Pakistan. The course provides review of the impacts of climate change on different cultural heritage sites of Pakistan. It deals with the management and planning issues using case studies. After going through the course the students will be able to identify and analyze critically various issues related to climate change in Pakistan. They will be able to formulate climate resilient strategies for the remedy of problems created by environmental hazards.	

Course outline: Concepts of Climate change: Meaning, Definition and Process of climate change in Pakistan .**Cultural heritage sites of Pakistan:** UNESCO World heritage sites in Pakistan Other important heritage sites of Pakistan **Significant impacts of climate change on cultural heritage of Pakistan Legislation: International Treaties, Conventions about cultural heritage National conservation strategy , Pakistan Environmental protection Acts Efforts to mitigate the impacts of climate change on cultural heritage sites**
Course outcomes: This course will help the students to understand the phenomenon of climate change and its consequences on the cultural heritage of Pakistan. This course will stimulate the students to take right action. This will also increase climate literacy among students so they will be able to make informed decisions about the cultural heritage of Pakistan in future. They will also learn how to adapt new techniques for the preservation of historical and cultural heritage of Pakistan.
Recommended Books: Gates, B. (2021). How to avoid a climate disaster: the solutions we have and the breakthroughs we need. Vintage. Carpenter, C.C and Dove, Michael R. (eds.) *Sociology of Natural Resources in Pakistan and Adjoining Countries*. Karachi: Vanguard, 1992. Chahal, S. K., *Environment and the Moral Life*. New Delhi: Ashish Publishing House, 1994. Comsats Institute of Information Technology, Proceedings of the International Conference on Environmentally Sustainable Development. Dasmann, Raymond F. *Environmental Conservation.* N.P: John Willey and Sons, 1972. Government of Pakistan Environmental Legislation in Pakistan, 2013 Shearman, David and Joseph. Wayne Smith, *Climate Change Challenge and the Failure of Democracy*, London: Pentagon Press, 2008. Harkin, D. V., Davies, M., Hyslop, E., Fluck, H., Wiggins, M., Merritt, O., & Westley, K. (2020). Impacts of climate change on cultural heritage. MCCIP Sci. Rev, 16, 24-39.

18. Climate Change and the National Security of Pakistan

Course Title:: Climate Change and the National Security of Pakistan	**Course Code: PST-325**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 02**
Prerequisites:	
Course Objective: In the last two decades, the world has struggled with climate change and global warming issues. This course aims at providing knowledge about the correlation between climate change and security issues in the world and narrows down to Pakistan. It will also highlight the impacts of climate change on the national security of Pakistan. The course will enable the students to identify the problems related to climate change and its impacts. It will also enable the students to evaluate essential remedial measures.	

Course Outline: Climate Change, Climate Change and Industrial Revolution Climate, weather and Natural disaster, Climate Change as challenge to Pakistan's National Security/ Effects of Climate Change and Consequences for Pakistan's National Security, Global warming, Cyclones, droughts and flooding, Water and food insecurity, Economic insecurity, Human insecurity , Rise of Violent Non State Actors, Catalyst to Civil, Ethnic and Interprovincial Conflicts, Natural disaster and economy , Pakistan's National Climate Policy, Climate Change and Foreign Policy of Pakistan.
Course Outcomes: This course will help the students to understand and tackle the consequences of global warming and will motivate them to take action. This will also increase climate literacy among people so they will be able to change their behavior and make informed decision. They will also learn how to adapt to climate change.
Recommended Books: Afifa Kiran and Qura tul Ain, "Climate Change: Implications for Pakistan and Way Forward," ISSRA Papers 8, no. 4 (2017). Ali Hasnain Syed, "Climate Change and Its Realities for Pakistan, Fresh Water Worldwide Fund for Pakistan," 2014. Kugelman, Michael. (2013, January). Urbanisation in Pakistan: causes and consequences. Norwegian Peacebuilding Resource Centre Memon, F. S. (2020). Climate Change and Violence Against Women: Study of A Flood-Affected Population in The Rural Area of Sindh, Pakistan. Pakistan Journal of Women's Studies: Alam-E-Niswan. Nils P. Gleditsch, "Whither the Weather? Climate Change and Conflict?" Journal of Peace Research, 2012 Shearman, David and Joseph. Wayne Smith, *Climate Change Challenge and the Failure of Democracy*, London: Pentagon Press, 2008. Government of Pakistan Environmental Legislation in Pakistan, 2013.

19. A SURVEY COURSE OF WORLD CIVILIZATIONS

Course Name: A SURVEY COURSE OF WORLD CIVILIZATIONS	**Course Code: HIS-302**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites:	
Course Objective: • Discuss for the evolution of the major civilizations of the ancient world and their education • Discuss their contributions to the present day world To dig out the roots of their termination	

20. Revolutionary Moments in History

Course Name: Revolutionary Moments in History	**Course Code: HIS: 313**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 2**
Prerequisites: None	
Course Objective: This course explores pivotal moments in history when societies underwent significant and often dramatic changes. Through an in-depth analysis of various revolutions, students will gain a comprehensive understanding of the causes, consequences, and the profound impact of these transformative events. By examining revolutions from different time periods and regions, students will not only develop a deeper appreciation for the complexities of historical change but also the lasting legacies that these revolutions left on societies.	
Course Outline: **Introduction to Revolutions:** Definition of a revolution**,** Overview of the course objectives and structure**,** Theoretical frameworks for analyzing revolutions**. The American Revolution:** Causes and key figures**,** Ideological and political developments**,** Impact on the world**. The French Revolution:** Causes, stages, and outcomes**,** Napoleon Bonaparte and the Napoleonic Era**,** The spread of revolutionary ideas**.** **The Industrial Revolution:** Economic and technological transformations**,** Social changes and urbanization**,** The impact on global trade and imperialism**,** The Russian Revolution**,** Background and causes**,** Bolshevik Revolution and the rise of communism**,** Impact on the 20th century**. The Chinese Revolution:** Nationalist and Communist movements**,** Mao Zedong and the People's Republic of China**,** Social and political transformations**. The Cuban Revolution:** Fidel Castro and the overthrow of Batista**,** The relationship with the United States**,** Legacy in Latin America**. The Arab Spring:** Causes and origins**,** Case studies from Egypt, Tunisia, and other countries**,** The role of social media and technology. **The End of Apartheid in South Africa:** Background and resistance movements**,** Nelson Mandela and the transition to democracy**,** Reconciliation and nation-building	
Course outcomes: After the completion of this course, students will have a well-rounded understanding of revolutionary movements in history, from their origins and causes to their far-reaching impacts. Students will also develop critical thinking skills, historical analysis abilities, and an awareness of the ethical and moral considerations associated with revolutionary actions**.**	
Recommended Books: (Min5-8Max) Bourne, H. E. *The Revolutionary Period in Europe*. Harper Collins, 1999. Burleigh, Michael, *Earthly Powers: The Clash of Religion & Politics in Europe*. Penguin Group,2001. Gershoy, Leo. *The French Revolution and Napoleon.*Simon & Schuster: New York, 2003. Grant, A. J. and H. Temperley. *A History of Modern Times from 1789*Simon & Schuster: London, 2003. Muir, Ramsay. *The Expansion of Europe* Oxford: Oxford university press, 1999. Ketelbey, C. D. M *Revolution to the Great War*. Harper Collins: UK, 2006 Smith, P. *The Enlightenment* Cambridge: Cmabridge University Press, 2003. Thompson, J. M. *The French Revolution.* Simon & Schuster: USA, 2007. Thomson, David, *Europe since Napoleon*. London: Oxford University Press, 1963 Viault, Birdsall S, Modern *European History: The History of Europe since the Late Middle Ages*. Penguin Group, 2005.	

21. History of Religions: A Case Study of South Asia

Course Name: History of Religions: A Case Study of South Asia	**Course Code: HIS: 314**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 2**
Prerequisites: None	

Course Objective:

South Asia as a crossroads of many civilizations is also very rich in different religions. Many religions flourished in this area from ancient to modern times. The purpose of this course is to give a broad overview of many of flourished religions in the world and exclusively in different areas of South Asia. The basic objective of the course is intended to give the students basic familiarity with major religions in today's world. This course will introduce students to a variety of avenues to study ancient religions, and traditions which laid foundations for indigenous primordial religions still practiced today.

Course Outline:

Introduction to Religions: Religion and the Concept of the Sacred, Major Religions of the World: Ancient religions and modern religions **. Major Modern religions:** Judaism**,** Christianity**,** Islam.
South Asian Religions: Hinduism**,** Buddhism**,** Jainism**,** Sikhism, Confucianism, Taoism or Daoism, Zoroastrianism or Parsi and Folk religions. **Beliefs and Ideologies, Impacts of Religion on South Asian people,** challenges and opportunities faced by these religions in the modern world. **Conclusive Remarks**

Course Outcomes: By the end of this course, students will have a comprehensive understanding of South Asian religions, their historical development, key beliefs, and practices, as well as their contemporary relevance and challenges. Students will also develop critical thinking and research skills that will enable them to engage with these religious traditions in a meaningful and informed way.

Recommended Books: (Min5-8Max)

Boyce, Mary. *Zoroastrians: Their Religious Beliefs and Practices*, Second Edition. London: Routledge, 2001.
Dundas, Paul. *The Jains.* New York: Routledge, 1992.
Eck, Diana L. *India: A Sacred Geography* New York: Random House, 2012.
Ellwood, Robert S and Gregory D. Alles. *The Encyclopedia of World Religions* Revised edition., United States of America: Library of Congress, 2007.
Gethin, Rupert. *The Foundations of Buddhism* Oxford and New York: Oxford University Press, 1998.
Hinnells, John. *The Zoroastrian Diaspora: Religion and Migration*. Oxford: Oxford University Press, 2005.
Kharak Singh, G.S. Mansukhani, and Jasbir Singh Mann (eds.). *Fundamental Issues in Sikh* Studies Chandigarh: Institute of Sikh Studies, 1992.
Kohn, Livia (ed.). *Daoist Identity: History, Lineage and Ritual*. Honolulu, HI: University of Hawaii Press, 2002.
Narayanan, Vasudha. *Hinduism* Oxford: Oxford University Press, 2004.

22. Introduction to Linguistics

Course Title:: Introduction to Linguistics	**Course Code: ENG-305**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 2**
Prerequisites: None	
Course Objective: This course provides an overview of the key concepts and principles in linguistics. Students will explore the nature of language, its structure, core components and its use in speech events. Various subfields of linguistics will also be introduced to help students understand about the linguistic analysis.	
Course Outline: (For Mid Term) (Brief discussions on the given topics) What is language? (definition, nature, function) Characteristics of language, What is Linguistics? Scope of linguistics,Brief historical overview of linguistics, **(For Final term) (Brief introduction of the given topics)** Major branches of linguistics, Phonology and phonetics, Morphology, Syntax, Semantics, Pragmatics , Sociolinguistics, Discourse analysis.	
Course Outcomes: Upon the completion of this course students should be able ➢ to understand the basic concepts of language ➢ to differentiate between various shades & aspects of language, ➢ to recognize the significance of linguistics in various fields of study ➢ to apply and analyze the linguistic principles in real world phenomenon and interactions	
Recommended Books: Latest Edition of Following Books 1. Victoria A. Fromkin, Robert Rodman, and Nina Hyams, "*An Introduction to Language*" 2. Aitchison, J. (2000). *Linguistics.* Teach Yourself Books. 3. Akmajian, A., Demers, R. A., Farmer, A. K. &Harnish, R. M. (2001). *Linguistics: An Introduction to Language and Communication.* (Fourth edition). Massachusetts: MIT. 4. Farmer, A. K, & Demers, R. A. (2005). *A Linguistics Workbook*. M. I. T Press.	

23. Introduction to English Literature

Course Title:: Introduction to English Literature	**Course Code: ENG-306**
Course Structure: Lectures: 2, Labs: 0	**Credit Hours: 2**
Prerequisites: None	
Course Objective: This course aims at introducing students to the scholarly study of literature and to enhance their ability to understand and appreciate literature. ***It highlights the variety of poetic expression, forms and elements of poetry as well as familiarizes students with the fundamentals of drama, prose and novel i.e. characters, plot, setting, dialogue.*** In order to comprehend, analyze and discuss any given piece of literature (poem, novel, short story or	

drama), this course concentrates upon deepening students' knowledge of various artistic techniques, forms and styles that the writers employ in their work. **[For course instructors: Familiarize your students with the various literary forms, elements and terms.]**
Course Outline: Definition and Elements of Poetry (with examples) structure & form speaker & setting figurative language rhyme & meter theme, tone, mood , syntax and diction. **Definition and Elements of Drama, Novel, Short Story (with excerpts from examples)** plot, characters, Theme, Conflict, Setting, diction, music
Course Outcomes: By the end of this course, the students will be able to understand and appreciate literature. They will be familiar with the variety of poetic expression, forms and elements of poetry as well as the fundamentals of drama, prose and novel i.e. characters, plot, setting, dialogue.
Recommended Books: Latest Edition of Following Books 1. Kennedy, X. J., and Dana Gioia. *An Introduction toPoetry*. Longman, 2010. 2. Gwynn, Dana. *The Art of the Short Story*. Pearson P T R, 2005. 1. Barnet, Sylvan, and William E. Cain. *A Short Guide to Writing about Literature*. Addison-Weseley Longman, 2005.

24. Arabic Language

Course Title:: Arabic language	**Course Code: IsL-302**
Course Structure: Lectures: 3	**Credit Hours: 3**
Course Objectives: i.The students should be able to understand Arabic language (reading, writing, listening and speaking). ii.The students should be able to go to the Arabic references for their Islamic studies without consulting translation iii.The students should have adequate knowledge of the basic and important grammars in Arabic language to assess them in read, write, and understand any resources in Islamic studies.	
Course Contents	
الوحدة الأولى: التحية والتعارف(الدرس 1، 2، 3)4 5،6)، الوحدة الثانية: الأسرة (الدرس 7 و 8 ،9و 10 11و 12)، الوحدة الثالثة : السكن(الدرس 13 ،14 و ،15،16 الدرس17 و الدرس18) الوحدة الرابعة: الحياة اليومية الدرس19، 20، 21 ،22 23، الدرس24،)الوحدة الخامسة: الطعام و الشراب الدرس25، 26، 27 ،28، 29، الدرس30) الوحدة السادسة: الصلاة الدرس31، 32، 33 ،34 35ا، الدرس36،) الوحدة السابعة : الدراسة الدرس37، 38،39 ،40، 41، الدرس42) الوحدة الثامنة: العمل الدرس43، 44، 45 46،47، الدرس48)	

Recommended books:
دکتور عبدالرحمن بن إبراهيم الفوزان ، مختار الطائر ،محمد عبدالخالقالعربية بين يديك
اللغة العربية للناشئين، دار الثقافة، کتب خانه امداديه، بشاور
عبد الرحيم، اللغةالعربية لغير ناطقين بها ، لجنتة الاساتذة، کتب خانه امداديه، بشاور

Social Sciences

25. Introduction to Economics

Course Title: Introduction to Economics	**Course Code: ECO-301**
Course Structure: Lectures: 2	**Credit Hours: 02**
Prerequisites: None	
Course Objective: This course provides students with a broad introduction to, and overview of, introductory economics, covering both microeconomics and macroeconomics. The course will enable the students to explain and apply basic economic terminology. It will enable to some extent to articulate economic reasoning based on micro and macro analysis.	
Course Outline: Introduction to economics: what do economist study, Scarcity choice and economic systems, The nature of economic reasoning, Branches of economics (Micro & Macro). Demand & Supply: Demand, Supply, Price & Output determination, Elasticity, Time Dimension (short run & long run). Microeconomics – Background to Demand: Utility Analysis, Indifference curve. Microeconomics-Background to Supply: Background to cost (short & long run theory of production), Cost of production, Revenue under different Market structure (only basics and definitions, not adv theory), Profit maximization. Macroeconomic Issues-I: The Scope of Macroeconomics, Unemployment (definition & types), Inflation (definition & types). Macroeconomic Issues-II: National income accounts (concepts and measurements of national income), Circular flow of income, The Balance of payments.	
Course Outcomes: At the end of this course the student will be able to use economic terms correctly, understand how markets work, when markets fail and how the government can affect market outcomes.	
Recommended Books: Latest Edition of the Following Books. 1. Sloman, John (2012), Economics, New York: Pearson Prentice Hall 2. Robert Frank and Ben S Bernanke, (2009), Principles of Economics, McGraw- Hill; Fourth Edition edition (2009) 3. Paul A. Samuelson, (latest ed), Economics. Tata McGraw-Hill Education 4. Begg, David, Gianluigi Vernasca, Stanley Fischer, and Rudiger Dornbusch, (2011), Economics, 10th edition, London: McGraw and Hill.	

5. Mankiw, N.G. and Taylor, Mark, (2014), Economics, Cengage Learning, Third Edition

26. Economy of Pakistan

Course Title: Economy of Pakistan	**Course Code: ECO- 306**
Course Structure: Lectures: 2	**Credit Hours: 02**
Prerequisites: None	

Course Objective: The course aims at the understanding of national and international issues faced by Pakistan economy.
The student will be able to understandthe economy of Pakistan

Course Outline:

Overview of Pakistan Economy: Development Experience, Approaches, Policies and Outcomes, Identification of Issues: The era of 1950's, 1960's, 1970's, 1980's 1990's and 2000's. Structural Change and Sources of Growth, Emergence of Economic Issues, Human Resource Development, Unemployment, Poverty, Income Distribution, Debt, Deficit etc Growth with limited development in Pakistan. Agriculture and Industrial Development: Emerging Issues: Pattern of Agricultural and Industrial Development, Land Reforms and Its Impacts, the Role of Green Revolution and its Impacts: Present Status.

Agricultural Price Policy and Income Tax, Sectoral Terms of Trade, Industrial Development Policies and Strategies, Development of Large and Small Industries, Value Added: Manufacturing Goods Vs. Primary Goods Production, Agriculture Vs. Industry: Development Debate. Sectoral Development, Employment Pattern and Unemployment:

Sectoral Priorities and Development Issues, Human Resource Development and Emerging Issues: Population Growth, Labor Force Participation Rate and Employment Pattern, Unemployment and Underemployment, Forecasting Manpower Needs and Employment. Strategies to combat unemployment, Criteria to Measure Unemployment/ Underemployment: Time Criterion, Productivity Criterion and New Index of Unemployment: Application to Pakistan and Empirical Evidences. Good Governance, Social Action Plan and its Impact. Role of Institution in Development, Social Sectors development Vs. High Return Sectors: Growth trade off. International Debt and Dependency in Pakistan: Concepts of Foreign Aid and Debt, Borrowing Vs. Domestic Reserve Mobilization (failure), Size of Foreign Debt, Debt Saving and its Impacts in Pakistan . Strategies to combat with High Debt in Pakistan. Debt Management in Pakistan and Its Impacts. Poverty and Income Distribution: Pattern of Income Distribution: Rural and Urban. Definitions and Approaches to Measure Poverty in Pakistan : Income Approach, Expenditure Approach, Basic Needs Approach, Poverty of Participatory Index (POPI). How to Combat Poverty in Pakistan, Evasion of Policies / Strategies to Combat Poverty and Improving Income Distribution. Neglect of Human Resource Development, Child Labor, Factors Productivity Issues

Course Outcomes: Upon completion of the courses, the students will be able to identify major economic problems and give appropriate solutions**.**

Recommended Books: Latest Edition of the Following Books.

- Aslam M., (2001-2002). Perspective on Development Planning In Pakistan, Lahore : Allied Book Centre.
- Chaudhary M.Aslam and Ahmad Eatzaz., (2004).Globalization, WTO and TradeLiberalization in Pakistan, Lahore: FerozSons.
- Chaudhary M. Aslam,.(1989).Human Resource Development and Management in Pakistan, Lahore: Ferozsons.
- Khan, Shahrukh R., (2000). 50 Years of Pakistan's Economy – Traditional Topics andContemporary Concerns. Karachi: Oxford Univ. Press.
- Mahbool-ul-Haq Centre for Human Development (MHCHD),. (1989).Poverty Profileof Pakistan, Karachi: Oxford University Press.
- Human Development in South Asia, Annual Report.
- Saeed, Khawaja Amjad,. (2004).The Economy of Pakistan, Karachi: Oxford University Press.
- Zaidi, Akbar, (1999), Issues in Pakistan Economy, Oxford Univ., Press, Karachi. World Development Reports, World Bank.

27. Understanding Psychology

Course Title: Understanding Psychology	**Course Code: PSY-301**
Course Structure: Lectures:	**Credit Hours: 02**
Prerequisites:None	
Course Objective: • To describe psychology with major areas in the field, • To identify the parameters of this discipline. Distinguish between the major perspectives on human thought and behavior. • To gain insight into human behavior and into one's own personality or personal relationships. Explore the ways that psychological theories are used to describe, understand, predict, and control or modify behavior.	
Course Outline: Introduction to Psychology: Definition and Scope of Psychology. Schools of Psychology **Sensation, Perception and Attention,** Sensation, Characteristics and Major Functions of Different Sensations, Perception, Definition of Perception, Factors affecting Perception: Subjective, Objective, Attention, Factors: Subjective and Objective, Span of Attention, Fluctuation of Attention, Distraction of Attention,**Motives,** Definition of motives, (Biogenic) Motives:,Sociogenic Motives,**Emotions:** Definition, Theories of Emotion : James Lange Theory; Canon-Brad Theory, Schechter-SingerTheory, **Learning:** Definition of Learning, Types of Learning: Classical and Operant Conditioning, Definition and Types of Reinforcement **Memory:** Definition, Sensory memory, short term memory, long term memory, Forgetting and theories of forgetting: decay theory, interference theory,motivational forgetting theory, **Thinking:** Definition, Problem Solving: strategies and obstacles.	

Course Outcomes: Students will have the basic knowledge of Psychology, human behavior, methods used in testing of human behavior.
Recommended Books: (Min5-8Max) Latest Edition of the Following Books. 1 Atkinson R. C., & Smith E. E. (2000). *Introduction to psychology* (13thed.).Harcourt Brace College Publishers. 2 Fernald, L. D., & Fernald, P. S. (2005). *Introduction to psychology*. USA:WMCBrown Publishers. 3 Glassman, W. E. (2000). *Approaches to psychology*. Open University Press.Hayes, N. (2000). *Foundation of psychology* (3rd ed.). Thomson Learning. Lahey, B. B. (2004). *Psychology: An introduction* (8th ed.). McGraw-Hill Companies, Inc. 4 Leahey, T. H. (1992). *A history of psychology: Main currents inpsychological thought*.New Jersey: Prentice-Hall International, Inc. 5 Ormord, J. E. (1995). *Educational psychology*: *Developing learners*. Prentice- Hall, Inc

28. Essential of Management

Course Title:: Essentials of Management	**Course Code: MS- 307**
Prerequisites: None	**Credit Hours:2**
COURSE OBJECTIVES: • The course aims to provide students with the basic managerial knowledge necessary for Business student. Upon successful completion of this course, students will be able to: • Demonstrate theoretical knowledge in management course.Gain practical skills and personal attributes and competencies that is required for managerial position. • Describe the four management functions of planning, organizing, leading, and controlling. Outline the historical evolution of management theories. • Explain how decisions are made within an organization and how those decisions are communicated to the various stakeholders and can Relate the basic concepts of planning: the importance of planning, strategic planning, and the types of objectives and plans developed by organizations. • Describe the control process including: the importance of control, tools for measuring organizational performance, and managerial actions and Understand analytical, developmental, managerial and technical skills relate to Managing organizations	
Course Outline: Introduction to Management-What is an Organization, The Management Process, Kinds of managersBasic managerial roles and skills. **History and Evolution of Management**-The Organization Environment,a. Internal Environment & External Environment. **Planning and Decision Making** -Decision making and planning process-Organizational Goals and their kinds,Organizational plans and their kinds a. Strategic, Tactical Plans &. Operational Plans. **Strategic Management-** Strategic Management Process, Strategy Formulation, Strategy Implementation Strategy Evaluation Organizing. **Organization Structure-**a. Tall Vs Flat, Narrow Vs Wide,c. Centralized Vs	

Decentralized, Strategy and Organization Design,. Corporate Level Strategy,. Business Level Strategy & Organizational Functions. **Motivation and its theories-** Content Perspective of Motivation Maslow Hierarchy of Needs theory,ERG theory,Two Factor Theory, Process Perspective of Motivation Expectancy Theory, Equity Theory, Groups and Teams in Organization, Types of Groups and Teams group and Team Development Process. **Leadership and Power-** Leadership Styles.**Control-**Types , level & Process of control.
Course OutComes: • Apply management theories to solve complex real-world business challenges and can Demonstrate effective leadership and interpersonal skills essential for managerial roles. • Can be able to explain the historical evolution of management theories and their contemporary relevance. • Demonstrate competence in decision-making and effective communication within organizations. • Analyze and implement strategic planning and diverse organizational structures. • Utilize control processes and performance measurement tools to enhance organizational efficiency.
Recommended Books: ▪ Ricky W. Griffin (2015).Introduction to Management. 8th Edition. Cengage Learning 20 Channel Center Street Boston, USA ▪ John R. Schermerhorn. (2015). Introduction to Management by John Wiley & Sons; 13th Edition International Student Version (April 14, 2015). ▪ Drucker, P. F. (2008). Management: Tasks, responsibilities, practices. HarperCollins. ▪ Kotter, J. P. (1996). Leading change. Harvard Business Review Press. ▪ Covey, S. R. (1989). The 7 habits of highly effective people. Free Press. ▪ Collins, J. C. (2001). Good to great: Why some companies make the leap... and others don't. HarperBusiness.

29. Basics of Human Resource Management

Course Title: basics of Human Resource Management	**Course Code: MS-308**
Course Structure: Lectures:	**Credit Hours: 2**
Prerequisites:	
Course Objective: This course is basically designed to provide students the basic understanding of key HRM functions, which include HR planning, recruitment & selection, compensation, performance evaluation, and training & development. Since human resource provides a competitive	

advantage that ultimately has a vital role in success and effectiveness of any organization, this course emphasizes on the understanding of the basic concepts of managing human resource and their applications in today's organizations. The course is designed to help the students understand if western human resource management theories and practices have any relevance to the local settings. The course will also discuss the Islamic perspective of managing human resource. It will shed light on the basic tenets of human resource management given by Qura"n and Sunnah. The students will also be encouraged to compare and contrast the human resource practices sugTgested in their text books and the practices critical for achieving success from indigenous perspective.

Course Outline:

Introduction of HRM, Why HRM is important, HR Planning and Job analysis- Job Description Job Specification, Recruitment, Selection of employees, Performance management, Training and development, Managing compensation, Designing and administering benefits, Managing employee relations.

Course Outcomes:

At the end of this course, students should be able to

1. Demonstrate an in-depth knowledge of the activities and decisions that inform the employment relationship and management including recruitment, selection, training, health and safety, employment laws, motivation, and productivity of employees
2. Understand the relevance of the HRM theories and practices, developed in Western settings, in indigenous cultures.
3. Develop and design different forms and memos for recruitment, selection, TNA and performance appraisal of employees.
4. Understand the Islamic perspective of managing human resource.
5. Demonstrate and assess leadership in a professional context, by selecting and appraising appropriate styles for situations, and contributing and discussing relevant expertise, liaising with and assessing professional colleagues, and managing and evaluating a supporting team.
6. Identify and discuss ethical implications of situations and decisions, and develop an appropriate professional stance.

Recommended Books:

1. Gomez-Mejia, L. R., Balkin, D. B., Cardy, R. L., & Carson, K. P. (2004). Managing human resources. Pearson Education; 6 edition
2. Noe, R. A. (2019). Human resource management: Gaining a competitive advantage. McGraw-Hill Education.

3. Dessler, G. (2019). Human resource management. Pearson.
4. Mathis, R. L., & Jackson, J. H. (2017). Human resource management: Essential perspectives. Cengage Learning.
5. Milkovich, G. T., Newman, J. M., & Gerhart, B. (2021). Compensation. McGraw-Hill Education.
6. Cascio, W. F., & Boudreau, J. W. (2016). Investing in people: Financial impact of human resource initiatives. Pearson.

30. Introduction to Islamic Finance

Course Title:: Introduction to Islamic Finance	**Course Code: MS- 413**
Course Structure: Lectures 3	**Credit Hours:** 3
Prerequisites: None	

Course Objective:

The main objectives of the Islamic Banking and Finance course are to:

- Explain the origins and the most important concepts of Islamic Finance
- Expose the participants to a wider range of Islamic banking and finance instruments available to the industry players.
- Introduce countries where Islamic Finance is practiced and widely used and share various business experiences.
- Provide general education in the field of Islamic Banking and Finance
- Help the development of the Islamic Finance

COURSE CONTENTS: A Brief Overview of Economic Systems, Capitalism, Communism, Islamic Economic System Islamic norms of trade, History of Islamic banks,Islamic banking in Pakistan,Conventional Vs Islamic banks, Growth and challenges. **Musharakah-** Introduction, Basic Rules related to Distribution of profits, Sharing of loss, The Nature of the Capital & Termination of Musharakah. **Management Of Musharakah-**Termination without Closing Business & Diminishing Mushaira. **Mudarabah-** Introduction, Distribution of the Profit,Termination of the Mudarabah. Murabaha- Some Basic Rules of Sale, Bai' Mu' ajjal (sale on deferred payment),Murabaha as a mode of financing. **Ijarah-**Basic Rules of Leasing,Determination of Rental,Lease as a mode of Financing, The Commencement of Lease,Different Relations of the Parties & Expenses consequent to ownership. **Salam and Istisna-**Salam and Istisna-Meaning of Salam, Conditions of Salam & Salam as a Mode of

Financing. **Istisna-** Difference between Istisna and Salam, Difference between Istisna and Ijarah, time of delivery,Istisna as a Mode of Financing

Course Outcomes: Upon successful completion of the course participants will:

- Know the origins of the Islamic Banking and Finance.
- Appreciate the rationale behind the development of the Islamic finance industry.
- Be able to assess the nature and scope of the Islamic finance industry in relation to its conventional counterpart.
- Develop an appropriate level of understanding of the main principles of Islamic banking and finance.
- Acquire essential knowledge about the key Islamic financial contracts, as used by the industry.
- Know about Murabaha and Musharaka contracts, Ijara and Istisna'a financing methods, as well as Salam and Takaful insurance.
- Be familiarized with the Islamic financial infrastructure, international financial institutions, and regulatory bodies.

Recommended Book

1. Mufti Muhammad Taqi Usmani (2021)An Introduction to Islamic Finance.BRILL.
2. Siddiqui, M. N. (2006). Islamic banking and finance in theory and practice: A survey of state of the art. International Journal of Islamic and Middle Eastern Finance and Management, 1(2), 84-120.
3. Khan, F. (2017). Islamic banking in Pakistan: Shariah-compliant finance and the quest to make Pakistan more Islamic. Springer.
4. Iqbal, M., & Mirakhor, A. (2007). An introduction to Islamic finance: Theory and practice. John Wiley & Sons.
5. El-Gamal, M. A. (2006). Islamic finance: Law, economics, and practice. Cambridge University Press.
6. Usmani, T. (2002). An introduction to Islamic finance. Idaratul Ma'arif.
7. Warde, I. (2000). Islamic finance in the global economy. Edinburgh University Press.
8. Archer, S., & Karim, R. A. (2008). Islamic finance: The new regulatory challenge. Wiley.
9. Chapra, M. U. (1997). Islam and the economic challenge (2nd ed.). Islamic Foundation.
10. Kahf, M., & Khan, T. (Eds.). (2008). Islamic finance: Instruments and markets. International Monetary Fund.
11. Wilson, R. (2007). Islamic finance in Europe: The establishment and operation of Islamic banks in the United Kingdom. Edinburgh University Press.

Natural Sciences

31. General Biochemistry

Course Name: General Biochemistry	**Course Code:** BCHM- 402
Course Structure: Lectures: 3, Lab: 0	**Credit Hours:** 3
Prerequisites: None	

Course Objectives:

This course provides basic concepts in biochemistry, which focuses upon the major macromolecules and chemical properties of living systems.

Primary topics include the structure, properties and functions of proteins, carbohydrates, lipids and nucleic acids.

Course Contents:

Amino acids, peptides, and proteins: standard amino acids, their structure and classification; acid/base properties of amino acids; non-standard amino acids, their structure and role; peptides, their composition; Types and structure of proteins

Enzymes: introduction; important characteristics of enzymes; immobilized enzymes; how enzymes work; example of enzymatic reaction; enzyme kinetics, enzyme rate of reaction and substrate concentration, how ph and temperature effect enzyme activity

Carbohydrates: classification, types, important characteristics and structure of carbohydrates

Lipids: fatty acids, their types and major characteristics; and major functions.

Vitamins and cofactors: occurrence, structure and biochemical function of vitamins of b- complex group.

Bioenergetics: concept of free energy; standard free energy change: energy rich compounds.

Metabolism: detailed description of glycolysis and catabolism of other hexoses; regulation and bioenergetics of glycolysis. Anabolic role of glycolysis; fate of pyruvate under aerobic and anaerobic conditions, lactate, acetyl CoA and ethanol formation; alcoholic fermentation; gluconeogenesis, its regulation and significance in the tissues

Citric acid (TCA) cycle: conversion of pyruvate to acetyl CoA, pyruvate dehydrogenase, a multi-enzyme complex; detailed description of citric acid cycle; bioenergetics and conservation of energy produced in the cycle.

Lipid metabolism: oxidation of fatty acids; digestion, mobilization and transport of fats; biosynthesis of triacylglycerol; utilization of triacylglycerol; activation of fatty acids and their transportation to mitochondria; beta-oxidation; cholesterol metabolism: cholesterol biosynthesis and its regulation; steroid hormones.

Nitrogen metabolism: metabolic fate of amino acids; catabolism of amino acids; deamination and transamination; nitrogen excretion and urea cycle; regulation of urea cycle; Biosynthesis of some amino acids; incorporation of ammonia in glutamate and glutamine; purine and pyrimidine.

Books Recommended

Nelson, D. L. and Cox, M.M. LEHNINGER PRINCIPLES OF BIOCHEMISTRY, 3rd Edition, 2000. McMillan Worth Publishers, New York.

Murray, R.K., Granner, D.K., Mayer, P.A. and Rodwells, V.W. HARPER'S BIOCHEMISTRY, 25th Edition, 2000. McGraw Hill, New York.

Voet. D., Voet, J.G., and Pratt, C.W. FUNDAMENTALS OF BIOCHEMISTRY, 1999. John Wiley and Sons, Inc., New York.

Zubay, G. BIOCHEMISTRY, 4th Edition, 1995. Wm. C. Brown Publishers, Inc., Oxford, England.

Lubert, S. BIOCHEMISTRY, 4th Edition, 1995. W.H. Freeman & Company, New York.

McKee, T. and McKee, J.R. BIOCHEMISTRY, THE MOLECULAR BASIS OF LIFE. 3rd Edition, 2003. McGraw Hill.

Plummer, David T. AN INTRODUCTION TO PRACTICAL BIOCHEMISTRY, 1990. 4th Edition McGraw-Hill Book Company, London.

Wilson, K & Walker, J. PRACTICAL BIOCHEMISTRY: PRINCIPLES AND TECHNIQUES, 4th Edition, 1994. Cambridge University Press.

32. Introduction to Bioinformatics

Course Title: Introduction to Bioinformatics	**Course Code: BI-401**
Course Structure: Lectures: 2, Labs: 1	**Credit Hours: 3**
Prerequisites: None	
Course Objective: This course is designed for students with little to no prior experience in bioinformatics. It provides a foundational understanding of the core concepts, tools, and techniques in bioinformatics.	
Course Outline: Introduction to Bioinformatics, Biological Databases, Types of Biological databases, Human genome and browsers, Genome sequencing methods, sequencing of human genome, DNA, RNA, and protein sequences retrieval and analysis, Sequence alignment and BLAST, Pairwise and Multiple Sequence Alignment, Sequence Polymorphism, What is Phylogenetics, Phylogenetic tree construction and analysis, Structural Bioinformatics, Introduction to protein structure, PDB (Protein Data Bank), Protein structure visualization, Primer designing, Genomics and Proteomics, students Projects. **Lab Outline:** Introduction to NCBI, Navigating the NCBI website, Comparison of sequences using Basic Local Alignment Search Tool (BLAST), Interpretation of BLAST search results, UCSC genome browser, Pairwise and multiple sequence alignment using ClustalW, Protein Data Bank, Swiss Prot, Pymol viewer or any available protein structure visualizer, Primer 3 and Oligo analyzer 3.1.	

Course Outcomes: By the end of the course, students will be able to analyze biological data, perform basic sequence analysis, and grasp key principles in genomics and proteomics.
Recommended Books: Latest Edition of Following Books 1. **Bioinformatics Sequence and Genome Analysis**, D.W. Mount, Cold Spring Harbor Laboratory Press 2004 2nd Edition. ISBN 0-87969-597-8. 2. Zvelebil, M. J., & Baum, J. O. (2008). **Understanding bioinformatics**. New York (N.Y.): Garland science. 3. Arthur M. Lesk, **Introduction to Bioinformatics.5**th Edition (2019).Oxford University Press. 4. Jin Xiong, **Essential Bioinformatics**,(2006), Cambridge University Press 5. Thomas Dandekar, Meik Kunz, **Bioinformatics An Introductory Textbook, (**2023**),** Springer-Verlag GmbH Germany, part of Springer Nature 6. Ignacimuthu SJ. **Basic Bioinformatics**, 2nd Edition (2005) Narosa Publishing House.

33. Fundamentals of Bioinformatics

Course Title: Fundamentals of Bioinformatics	**Course Code: BI-409**
Course Structure: Lectures: 2, Labs: 1	**Credit Hours: 3**
Prerequisites: Cell Biology, Molecular Biology	
Course Objective: The course is designed to introduce the most important and basic concepts, methods, and tools used in Bioinformatics. This course will introduce basic biological database sources, principles, and methods for sequence and genome analysis. The overall aims are a. To help the students to reach rapidly the frontier of bioinformatics and be able to use the bioinformatics biological Databases. b. To convey the importance of bioinformatics for viewing biomedical information. c. To provide hands-on experience using Biological Databases searching, retrieving, critically evaluating results, and interpreting their biological significance.	
Course Outline: Introduction, Goals, Scope, Applications, Limitations. Databases, Types of Databases, Biological Databases, Sequence Storage, Information retrieval and analysis, Sequence Alignment, Similarity and homology, Types of alignments, local and global alignment, Methods of Alignment, pairwise and multiple sequence alignments, Significance of Sequence Alignment, Algorithm, Sequence Alignment Methods, Relationship of multiple sequence alignment to phylogenetic analysis, DNA sequence Analysis, Protein Sequence Analysis. Motif Search, Molecular phylogenetic, Phylogenetic Basis, Phylogenetic Tree construction methods and Programs. Molecular Modeling and Drug Designing and Discovery.	
Lab Outline: Accessing NBCI databases, sequence databases, Genbank, EMBL, SWISS-PROT Accessing structure database PDB, SCOP and CATH, Expasy server, using online alignment tools for pair wise and multiple sequence alignment, using BLAST and FASTA, phylogenetic analysis.	

Molecular Modeling and Drug Designing.
Recommended Books: 1. Arthur M. Lesk, **Introduction to Bioinformatics**.5th Edition (2019).Oxford University Press. 2. Andreas D. Baxevanis (Ed), B. F. Francis Ouellette (Ed), **Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins**, 3rd edition, October 2004,Wiley, John & Sons, Incorporated, ISBN: 0471478784 3. S.C.Rastogi, N.Mendiratta,P.Rastogi,**Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery**. 3rd Edition (2009). PHI Learning Pvt. Ltd. 4. David Mount, **Bioinformatics: Sequence and Genome analysis**.2nd Edition (2004). Cold Spring Harbour Laboratories. 5. Thomas Dandekar, Meik Kunz, **Bioinformatics An Introductory Textbook, (**2023**),** Springer-Verlag GmbH Germany, part of Springer Nature 6.Jin Xiong, **Essential Bioinformatics**,(2006), Cambridge University Press

34. Climate Change and Human Health

Course Title:: Climate Change and Human Health	**Course Code: BIT- 414**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: None	
Course Objective: The course "Impact of Climate Change on Human Health" provides a comprehensive exploration of the complex relationship between climate change and its impacts on human well-being. It covers various aspects of climate change, its drivers, and the direct and indirect ways it affects human health.	
Course Outline: Introduction to Climate Change, Causes and Impact of Rapid Climate Change, Climate Change and Public Health, Extreme Weather, Extreme Temperature and Human Health, Climate Change and Air Quality, Vector-Borne Diseases and Changing Patterns, water born diseases and changing pattern, mental health and climate change, Water security and Climate Change, Measures Against Climate Change, Adaptation and Mitigation Strategies, Case Studies and Group Discussions, Communication and Advocacy.	
Course Outcomes:	
Recommended Books: Latest Editions of the Following Books. 1. McMichael, A. J., & Lindgren, E. (Eds.). (2011). Climate change and human health: Risks and responses. World Health Organization. 2. Patz, J. A., Gibbs, H. K., & Olson, S. H. (2008). Climate change and global health: Quantifying a growing ethical crisis. EcoHealth, 5(4), 397-405. 3. Butler, C. D. (2018). Climate change and global health. CABI.	

35. Pharmacology

Course Title:: Pharmacology	**Course Code: BIT-682**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: Molecular biology, cell biology, immunology, biochemistry,	
Course Objective: To familiarize students with the general process of drug development, basic concepts of biopharmaceuticals and their advantages over conventional drugs. Understanding the mechanism of action of drugs and their administration	
Course Outline: Introduction to pharmacology; basic concepts, brief history, properties of an effective drug; drug development process; selection of a lead molecule from available pool, drug toxicity; impact of genomics and other related technologies on drug discovery; pharmacogenomics; Pharmacokinetic and pharmacodynamic principles, drug metabolism, chemotherapeutic drugs	
Recommended Books: Latest Editions of the Following Books. 1. Lippincott Illustrated Reviews: **Pharmacology (Lippincott Illustrated Reviews Series)** 8th Edition (2022) 2. Hardman, J. G., et. al., eds. Goodman and Gilman's **The Pharmacological Basis of Therapeutics**. 10th ed. New York, NY: McGraw-Hill, 2001. ISBN: 9780071354691. 3. Golan, D., et. al., eds. **Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy**. Philadelphia, PA: Lippincott Williams and Wilkins, 2004. ISBN: 9780781746786. 4. Carruthers, et. al., eds. Melmon and Morrelli's **Clinical Pharmacology**. 4th ed. New York, NY: McGraw-Hill, 2000. ISBN: 9780071054065 . 5. Virginia Poole Arcangelo, Andrew M. Peterson, Veronica Wilbur, Dr. Tep M. Kang **Pharmacotherapeutics for Advanced Practice: A Practical Approach**. LWW; Fifth, North American edition (2021)	

36. Biosafety and Bioethics

Course Name: Biosafety And Bioethics	**Course Code: BIT-402**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites:	
Course Objective: To acquaint students with principles of biosafety and ethical perspectives pertaining to biotechnology.	

Course Outline:
Introduction to Biosafety - definition, concept, uses and abuses of genetic information, and biohazards; good laboratory practices; risks related to genetically modified organisms (GMO); international rules and regulations for biosafety and GMOs; introduction to bioethics; ethical issues related to GMOs; euthanasia, reproductive and cloning technologies, transplants and eugenics; patenting, commercialization and benefit sharing; role of national bioethics committees; biosafety guidelines from a national perspective.

Course Outcomes:
1. Students will gain a comprehensive understanding of biosafety, encompassing the definition, concept, and the responsible use of genetic information.
2. Learn about exploration of biohazards, potential risks associated with genetic modification, and the principles of good laboratory practices.
3. By the end of the course, participants will be equipped with the knowledge to identify and mitigate potential dangers in a laboratory setting.

Recommended Books:

1. Altman A and Hasegawa PM, 2012. Plant Biotechnology and Agriculture: Prospects for the 21st Century. 1st Edition; Academic Press.
2. Laboratory Biosafety Manual, WHO, 2006. 3rd Edition; AITBS Publishers and Distributors, India. (Available online free of cost).
3. Furr AK, 2000. CRC Handbook of Laboratory Safety. 5th Edition; CRC Press.
4. Jose Maria A, 2003. Genes Technology and Policy. Available online at; http://www.apdip.net/publications/iespprimers/eprimer-genes.pdf
5. Krishna VS, 2007. Bioethics and Biosafety in Biotechnology. New Age International Publishers.
6. National Biosafety Guidelines, 2005. Pakistan Environmental protection Agency (*Available online*)

37. Introduction to Biology

Course Title: Introduction to Biology		**Course Code: BOT-305**
Course Structure: Lecture. 3 **Lab. 0**		**Credit Hours:** 3
Pre-requisite	None	

Objectives: The course aims to:

- Understand the basic principles and theories that govern the study of biology.
- Explore the diversity of life and the classification of organisms.
- Examine the structure and function of cells, tissues, and organs.

Outcomes: Upon completion of this course, students will be able to:

- Explore the diversity of life, the structure and function of living organisms, and the processes that sustain life.

Contents	Introduction to Biology (Definition and scope of biology); The Nature of Life (Characteristics of living organisms, Levels of biological organization); The Diversity of Life (Classification and taxonomy of organisms, Evolutionary relationships and phylogenetic trees); Cell Structure and Function (The cell theory and the basic components of cells, Cell organelles and their functions); Cell Division and Genetics (The cell cycle and mitosis, Principles of genetics and inheritance); Evolution and Natural Selection (Principles of evolution and the evidence supporting it, Mechanisms of natural selection and adaptation); Ecology and Environmental Biology (Ecosystems, populations, and communities, Interactions between organisms and their environment); Physiology and Homeostasis (Organ systems and their functions, Regulation of internal body conditions); Plant Biology (Structure and function of plants, Photosynthesis and plant growth); Animal Biology (Structure and function of animals, Animal behavior and adaptations)
Books Recommended	• Simon, E. J., Dickey, J. L., & Reece, J. B., Biology: The Core, 2018, Pearson. • Campbell, N. A., Reece, J. B., Taylor, M. R., & Simon, E. J., Biology: Concepts and Connections, 2017, Pearson. • Mader, S. S., Essentials of Biology, 2017, McGraw-Hill Education. • Campbell, N. A., & Urry, L. A., Biology: A Global Approach, 2016, Pearson. • Morris, J., Hartl, D., & Knoll, A., Biology: How Life Works, 2016

38. General Botany

Course Title: General Botany		**Course Code:** BOT-306
Course Structure: Lecture. 3	Lab. 0	**Credit Hours:** 3
Pre-requisite	None	

Objectives: The course aims to:

- Help students become better informed regarding the role of plants in the environment and the use of plants by humans.
- Introduce students to the world of plants and to the fundamental concepts and processes that underlies their forms and functions.
- Develop concepts regarding the factors leading to the great diversity among plants and the need to maintain this diversity

Course Outcomes: Upon completion of this course, students will be able to:

- Explain the importance of plants in the environment, including their role in oxygen production, carbon dioxide absorption, and providing habitat for other organisms.
- Identify and describe the various parts of a plant, including roots, stems, leaves, and flowers, and understand their functions.
- Explain the process of photosynthesis and its importance in providing energy for plants and other organisms.

Contents

Introduction of Botany **(**History, scope and branches of Botany and its applications**);** The plant Cell **(**Chemical Composition**,** Cell Structures**,** Metabolism in Cells, including Photosynthesis); Plant Life Cycle and Reproductive Structures **(**Meiosis and alternation of generations, Flower structure**,** Fruit structure**,** Seed structure**,** Seed germination and its types**);** Plant Structure and Life Processes **(**Plant Tissues**,** Plant Organs: Roots, Stems and Leaves**,** Mineral, Nutrient and Water Transport in Plants**);** Non Vascular plants **(**Introduction to bryophytes, its history, methods of reproduction and classification, Introduction to algea its history, methods of reproduction and classification, Fungi and Lichens); Vascular plants **(**History and general characteristics of angiosperms and gymnosperms, General life cycle of angiosperms and gymnosperms); Fungi and Lichens **(**Introduction, History and General characteristics of Fungi and Lichens, Classification of Fungi and Lichens,)Reproduction in Fungi and Lichens

Books Recommended

- Pandey, B. P., College Botany Volume–III. S, 2022, Chand Publishing.
- Christenhusz, M. J., Fay, M. F., & Chase, M. W., Plants of the world: an illustrated encyclopedia of vascular plants, 2020, University of Chicago Press.
- Strasburger, E., Schenck, H., Jost, L., & Karsten, G., A Text-book of Botany, 2018, Macmillan.
- Shrestha, K. K., Bhattarai, S., & Bhandari, P., Handbook of Flowering Plants (Vol. 1 Gymnosperms and Angiosperms: Cycadaceae-Betulaceae), 2018, Scientific publishers.
- Lawrence, G. H. M., Taxonomy of vascular plants, 2017, Scientific Publishers.
- Kochhar, S. L. Economic botany, 2016, Cambridge University Press.
- Mauseth, J. D., Botany: an introduction to plant biology, 2014, Jones & Bartlett Publishers.
- Albersheim, P., Darvill, A., Roberts, K., Sederoff, R., & Staehelin, A., Plant cell walls, 2016, Garland Science.

39. Environmental Chemistry

Course Title: Environmental Chemistry	**Course Code: CHM-402**
Course Structure: Lectures: 2, Labs: 1	**Credit Hours: 3**
Prerequisites: None	

Course Objective:

1. To provide student with an understanding of the fundamental chemical processes that are central to important environmental problems.
2. To encourage student to utilize this knowledge in making critical evaluations of these problems.

Course Outline: Atmospheric Chemistry: The air around us, atmospheric temperature and pressure profile, temperature inversion and photochemical smog, particulate matter in the atmosphere, industrial pollutants, radioactivity, atmospheric aerosols, acid rain –major sources, mechanism, control measures and effects on buildings and vegetation, global warming – major greenhouse gases, mechanism, control measures and global impact, the stratospheric ozone – the ozone hole, CFCs, ozone protection, biological consequences of ozone depletion, **Water and Soil Pollution:** Sources of water pollution-industrial sources and agricultural sources, heavy metals contamination of water, soil and mineral resources, general principles of metal extraction, heavy metals contamination of soil, toxicity of heavy metals, bio-accumulation of heavy metals, organic matter in soil, macro- and micro-nutrients in soil, ion-exchange in soil, soil pH andnutrients availability

Lab (Cr.1)

Safety rules and regulations, techniques in solution preparation, the pH and buffer capacity of environmental waters, alkalinity of water samples, inorganic and organic profiles of soil and sediment cores, conductivity of various water samples, metals determination in water samples by electrogravimetry, determination of chloride ion in natural waters, determination of the temporary and permanent hardness of waters by complexometric and precipitation titration respectively, determination of the do, bod and chemical oxygen demand of natural waterand waste water using standard method, determination of the concentration of carbon dioxide in the atmosphere

Course Outcomes:

1. Demonstrate knowledge of chemical principles of fundamental environmental processes in air.
2. Apply basic chemical concepts to analyze chemical processes involved in different environmental problems.
3. Explain energy crisis and different aspects of sustainability.
4. Discuss local and global environmental issues based on the knowledge gained throughout the course.

Recommended Books:

1. Manahan, S. E. *Environmental Chemistry*, 11th ed., CRC Press, **2022**.
2. Hanif, M. A. Nadeem, F. *Environmental Chemistry: A Comprehensive Approach***,** Wiley-Scrivener, **2020**.
3. Hill, M. K. Understanding Environmental Pollution, 4th ed., Cambridge: Cambridge University Press. **2020**.
4. Loon, G. W. V. Duffy, S. J. *Environmental Chemistry: A Global Perspective***,** Oxford University Press, **2017.**
5. Salker, A. V. *Environmental Chemistry: Pollution and Remedial Perspective*, Alpha Science International Limited, 2**017**.
6. Jacobson, M. *Air Pollution and Global Warming*: History, Science, and Solutions, 2nd ed., Cambridge: Cambridge University Press. **2012**.
7. Pani, B. *Textbook of Environmental Chemistry*, I. K. International Pvt. Ltd., **2007**.

40. General Chemistry

Course Title: General Chemistry	**Course Code: CHM-300**
Course Structure: Lectures: 3, Labs: 1	**Credit Hours: 4**

Prerequisites: None

Course Objective:

1. Understand and explore the development of the Periodic Table, classify elements based on their electronic configurations in s, p, d, and f orbitals, and analyze group trends and periodic properties such as atomic radii, ionic radii, ionization potential, electron affinities, electronegativities, and redox potential, types of chemical bonding, including ionic, covalent, and metallic bonds. Apply Lewis structures, and molecular orbital theory to predict molecular shapes and bonding in diatomic and polyatomic molecules.
2. Investigate the concepts of acids and bases, including the SHAB concept and the relative strength of acids and bases.
3. Gain introductory knowledge of fundamental principles of thermodynamics, including the zeroth law, first law, and second law. Learn about internal energy, enthalpy, entropy, and Gibbs free energy, major functional groups in organic chemistry and their chemical reactivities.

Course Outline (Cr. 3)

The Periodic Law and Periodicity: Development of Periodic Table; Classification of elements based on *s, p, d* and *f* orbitals, group trends and periodic properties in *s, p, d* and *f* block elements, i.e., atomic radii, ionic radii, ionization potential, electron affinities, electronegativities and redox potential, **Principles of Chemical Bonding:** Types of chemical bonding; Lewis structures and prediction of shapes using VSEPR model, the localized bond approach: VB theory, hybridization and resonance; the delocalized approach to bonding: molecular orbital theory as applied to diatomic and polyatomic molecules, three center bonds, bonding theory of metals and intermetallic compounds; conductors, insulators and semiconductors; bonding in electron deficient compounds; hydrogen bonding, **Acids and Bases:** Concepts of acids and bases including SHAB concept, relative strength of acids and bases, significance of pH, pKa, pKb and buffer solutions. Theory of indicators, solubility, solubility product, common ion effect and their industrial applications, **Thermodynamics:** Thermodynamic system, surrounding, zeroth law of thermodynamics, concept of equilibrium, first law of thermodynamics, concept of internal energy, enthalpy, thermodynamic processes under different conditions (isothermal, adiabatic, reversibility concept), second law of thermodynamics, concept of entropy, Gibb's free energy, **Chemical Kinetics:** Rate of reactions, order of reactions, molecularity, extent of reaction, rate law, rate laws of zero-order and first-order reactions and differential and integrated forms, examples, concept of half-life and mean-life, factors affecting rates (Arrhenius equation), **Functional Group Chemistry:** A brief introduction to the chemistry of hydrocarbons, alkyl halides, alcohols, phenols, ethers, aldehydes, ketones, amines, and carboxylic acids and their derivatives.

Lab (Cr. 1)

Laboratory Ethics and Safety Measures: Awareness about the toxic nature of chemicals and their handling, cleaning of glassware, safe laboratory operations, **Qualitative Analysis:** Analysis of four ions (two anions and two cations) from mixture of salts, **Qualitative Organic Analysis:** Systematic identification of organic compounds (monofunctional and simple bifunctional) and preparation of their derivatives, Determination of heat of neutralization of an acid with a base.
Course Outcomes: Upon successful completion of the General Chemistry course, students should be able to: Demonstrate a sound grasp of key chemical concepts, including atomic structure, chemical bonding, and stoichiometry. Classify elements by orbitals, and describing and analyzing group trends and properties like atomic radii, ionization potential, electron affinities, electronegativities, and redox potential. Understand hybridization, resonance, localized and delocalized bonding, and the properties of conductors, insulators, semiconductors, and electron-deficient compounds. Apply thermodynamic principles to analyze energy changes in various processes and evaluate the factors influencing reaction rates.
Recommended Books: Latest Edition of the Following Books. 1. Brown, T. Le May, H. Bursten, B. Murphy, C. Woodward, P. Stoltzfus, M. *Chemistry: The Central Science (Mastering Chemistry)* ed. 14th, Pearson Education, **2017**. 2. Chang, R. Goldsby, K. *Chemistry* ed. 12th, McGraw Hill, **2015**. 3. Ebbing, D. Steven D *General Chemistry - Standalone book,* ed. 11tt, Cengage Learning, **2016**. 4. Silberberg, M. Amateis, P. *Chemistry: The Molecular Nature of Matter and Change*, Generic Publisher, **2023**. 5. Klein, D. R. *Organic Chemistry as a Second Language: Second Semester Topics*, ed. 5th, Wiley, **2019**. 6. Karty, J. *Organic Chemistry: Principles and Mechanisms*, ed. 2nd, W.W. Norton & Company, **2018**.

41. Nutritional Psychology

Course Title:: Nutritional Psychology	**Course Code: HND-512**
Course Structure: 3 Lectures	**Credit Hours:** 3(3+0)
Prerequisites: None	

Learning Outcomes:

To understand psychology, its types and importance in nutrition. To abreast the impact of psychological influences on appetite, attitude and behavior.

Theory:

Psychology: introduction, types, classification; Psychology and nutrition adherence; Attitude and eating patterns and the field of cognitive psychology; Perception, visualization and eating patterns, errors in perception process; Eating disorders: diagnosis, assessment and treatment; Face perception; Conceptual model of food choice; Psychological influences on appetite; Process over the life course, integration of biological, social, cultural and psychological influences on food choice; Understanding behavior: sensation, sense organs/special organs, attention and concentration, memory and its stages, methods for improvement, types and theories of thinking, cognition and levels of cognition, problem solving and decision making strategies, attitude behavior relationship; Measurement issues, indirect effects of attitude on behavior; The theory of reasoned action; Additional variables within the theory of planned behavior; Personality and intelligence; Stress management.

Suggested Readings:

1. Blackman, M.C. and C.A. Kvaska. 2011. Nutrition Psychology: ImprovingDietary Adherence. Jones and Bartlett Learning Publishers, Ontario, Canada.
2. Booth, D.A. 1994. The Psychology of Nutrition. Taylor & Francis Inc., Bristol,PA, USA.
3. The Psychology of Eating: From Healthy to Disorders Behavior,Wiley Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK. Latest Edition.

42. Food Chemistry

Course Title:: Food Chemistry	**Course Code: FST-623**
Course Structure: 3 Lectures	**Credit Hours: 3**(3+0)
Prerequisites: None	

Learning Outcomes:

To acquire knowledge and skills for understanding the main physical, chemical and functionalproperties of food

To understand and be able to control the major chemical and biochemical reactions that influencefood quality with emphasis on food industry applications

To acquaint information about different food components and interactions among them to modulate the specific quality attributes of food systems

Theory:

Cellular basis of foods; Water: properties, types, water activity and its effect onshelf life of food; Carbohydrates: roles of in food structure, color, flavor and texture; Lipids: roles in food structure, color, flavor and texture, rancidity, emulsifiers; Proteins: roles in food structure, color, flavor and texture; Enzymes: enzymatic & non-enzymatic browning reactions, influences on color, flavor and texture; Technologies in minerals and vitamins fortification of foods, stability of vitamins; Food colors: natural & artificial colors, pigments; Flavors: characteristics, taste, odor and astringency, off-flavor, aromatic compounds, Chemistry involved in ripening processes of fruits and vegetables; Food additives.

Suggested Readings:

1. Belitz, H.D, W. Groschm and P. Schieberle. 2009. Food Chemistry. Springer Verlag,Germany.
2. Coultate, T. 2009. Food: The Chemistry of Its Components. The Royal Society ofChemistry, Thomas Graham House, Science Park, UK.
3. Damodaran, S., K. Parkin and O.R. Fennema. Fennema's Food Chemistry, Latest Edition. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
4. DeMan, J.M. 2007. Principles of Food Chemistry. Springer Verlag, Germany.
5. Velisek, J. 2014. The Chemistry of Food. John Wiley & Sons Inc., New York, USA.

43. Sports Nutrition

Course Title:: Sports Nutrition	**Course Code: HND-521**
Course Structure: 2 Lectures 1 Practical	**Credit Hours:** 3(2+1)
Prerequisites: None	

Learning Outcomes:

To emphasize the importance of proper fueling for physical activity, pre-andpost-workout

To provide an overview about dietary supplements, how they are regulated andhow to avoid use of contaminated dietary supplements. To highlight the risks associated with performance enhancing drugs including anabolic androgenic steroids

Theory:

The principles of fitness, motivation and conditioning; Nutrition for the athletes, stress management, preventing accidents, stretching, posture and aerobics; Vitamins and minerals supplementation for fitness; High and low intensity exercise, cross training, walking for weight control and case studies; Introduction to muscle contraction, fast and slow fibres, energy storage, fuels used for exercise; Energy balance, fluid balance, fueling cycle: Pre-exercise, during exercise and during recovery; Athletes eating plan, calorie goals, calorie values, carbohydrate goals, protein goals, fat, vitamins and mineral goals; Competition nutrition; Loosing, gaining and making weight for athletes; Eating disorder and athletes; Sports drink and supplementation; National and international regulations for supplements; Risks associated with performance enhancingdrugs; Metabolic Equivalent Task; My pyramid for sportsman.

Practical:

Bioelectric impedance analysis; Sweat rate and hydration status calculation; Calculation of BMR and RMR; Diet planning for different sportsmen like body builders, athletes, swimmers, etc. Preparation of sports drinks and food products according to accelerated needs; Use of sports supplements. Visit of sports centers and fitness clubs.

Suggested Readings:

1. Antonio, J., D. Kalman, J.R. Stout, M. Greenwood, D.S. Willoughby and G.G. Haff. 2008. Essentials of Sports Nutrition and Supplements. Humana Press, New York, USA.

2. Fink, H.H., A.E. Mikesky and L.A. Burgoon 2011. Practical Applications in Sports Nutrition, (Latest Edition). Jones & Bartlett Learning Burlington, MA, USA.

3. Lanham-New, S.A., S.J. Stear, S.M. Shirreffs and A.L. Collins. 2011. Sports and Exercise Nutrition. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.

4. Maughan, R.J. 2000. Nutrition in Sport: The Encyclopedia of Sports Medicine Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.

44. Basic Statistics

Course Title: Basic Statistics	**Course Code: STAT-304**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**

Prerequisites: Nil

Course Objective:

- To have introduction of statistics
- To equipped and prepare students for advance courses in the field of statistics.
- To achieve the capability of critical thinking about data and its sources

Course Outline:

Statistics, Sample, population, probability sampling, non-probability sampling. Estimation, point estimation, properties of good point estimator, interval estimation. Statistical Inference, Null and alternate hypothesis, Hypothesis Testing using Z-test, t-test. Type-I error, Type-II error, Regression and Correlation, Analysis of Variance.

Course Outcomes: After completing the course the students will be able to

- Interpret basic statistical concepts.
- Understand and interpret basic concepts of estimation, Regression and correlation.
- Understand the basics theory of Hypothesis Testing.

Recommended Books: Latest Edition of the Following Books.

1. Chaudhry, S.M. and S. Kamal, Introduction to Statistical Theory" Part I, II, 6th ed, 1996, llmi Kitab Khana, Lahore, Pakistan.
2. Trosset, Michael W. An Introduction to Statistical Inference and Its Applications with R. 2009, United States, CRC Press.
3. Illukkumbura, Anusha. Introduction to Hypothesis Testing. 2020, Independently Published.
4. Miles, Jeremy, and Shevlin, Mark. Applying Regression and Correlation: A Guide for Students and Researchers, 2001, India, SAGE Publications.
5. Rawlings, J. O., Pantula, S. G., and Dickey, D. A. Applied regression analysis: a research tool,2001, Springer Science & Business Media
6. Clark, G.M. and Cooke, D. "A Basic Course in Statistics" 4th ed,1998, Arnold, London.
7. Walpole, RE., Myers, R.H and Myers, S.L. 'Probability and Statistics for Engineers and Scientist" 8th edition, 2006, Prentice Hall, NY.
8. DeGroot, M. Schervish, M. Probability and Statistics. 4th edition,1986, Pearson Education Limited.
9. Yan, X. and Zu, X. G. Linear Regression Analysis: Theory and Computing,2009, World Scientific Publications.

45. Probability and Statistics

Course Title: Probability and Statistics	**Course Code: STAT-402**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**

Prerequisites:

Course Objective:
The course is designed to enable the students to understand basic concepts of Statistics, descriptive statistics and probability, conditional probability, random variables and probability distributions.

Course Outline:
Introduction to Statistics: Descriptive Statistics, Graphical presentation of data, Histogram, Bar charts, Pie charts, box-plot, stem and leaf plot. Measures of Central Tendency; mean, median and mode. Measure of dispersion; Variance and standard deviation; properties. Co-efficient of variation. Correlation and regression. Hypothesis testing.

Introduction to counting techniques; Permutation, combination. Basic concept of probability, random experiment, event, sample space. Laws of probability, conditional probability, Bayes theorem with application to discrete and continuous random variable. Random variables and Probability Distributions; Discrete Random Variables, Bernoulli trials, Binomial and Poisson distributions. Continuous Random Variable, probability density function and its properties. Normal Distribution and its properties.

Course Outcomes: At the end of the course the students will be able to:

- Demonstrate basic descriptive statistics and analyse and interpret data.
- Demonstrate the basic knowledge of probability and probability distributions.
- Use basic counting techniques (multiplication rule, combinations, and permutations) to compute probability and odds.

Recommended Books:

1. Clark, G.M. and Cooke, D. (1998), "A Basic Course in Statistics" 4th ed, Arnold, London.
2. Chaudhry. S.M.and Kamal, S. (1996), "Introduction to Statistical Theory" Parts I & II, 6th ed, Ilmi Kitab Khana, Lahore, Pakistan.
3. Mclave, J.T., Benson, P.G. and Snitch, T. (2005) "Statistics for Business & Economics" 9t ed, Prentice Hall, New Jersey.
4. Spiegel, M.R., Schiller, J.L. and Sirinivasan, R.L. (2000) "Probability and Statistics", 2nd ed. Schaums Outlines Series. McGraw Hill. NY.
5. Walpole, RE., Myers, R.H and Myers, S.L. (1998), 'Probability and Statistics for Engineers and Scientist" 6th edition, Prentice Hall, NY.
6. Weiss, N.A. (1997), "Introductory Statistics" 4th ed. Addison-Wesley Pub. Company, Inc.

46. General Science

Course Title: General Science	**Course Code: ZOL-301**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: None	

Course Objective: The objectives of this course are:

- The course covers core concepts in physical science, life science, and earth science.
- To study the interdependence of ecosystems and the organisms
- To study evolutionary forces to the diversity of ecosystems and of the species within them.

Course Outline: Course Overview; Science in Personal and social perspective: The Nature of science and scientific investigation (observations, inferences) Teaching of science: reflect upon the way prospective teachers learned science and how they want to teach science when they graduate. Populations and Ecosystems; Basic needs of living things: Interdependencies of living things (symbiotic relationships), Ecosystems and Habitats: Population Growth, survival and Extinction, Populations and Ecosystem, Diversity and Adaptations; Diversity of living things: systems of classification, Adaptations for survival: Evolution and Diversity, Diversity and Adaptation, Earth – The Blue Planet; Earth - an inhabitable planet: Weather and Seasons, Categorizing the world by continents, biomes, vegetation zones, climate zones, etc. Introduction to maps; reading and creating simple data charts, Constant changes on earth: Erosion/sedimentation, Earthquakes and Volcanoes, Force and Motion; Relationship among force, mass, and motion of an object, Interaction of objects as it relates to force and linear, constant motion. Graphing of motion and basic calculations of speed and average speed, Non-linear motion and accelerated motion (Laws of motion), Graphing of nonlinear and accelerated motion, Properties and Matter, Physical properties of matter, including melting point, boiling point, hardness, density, and conductivity, Atoms, molecules, mixtures, elements, and compounds, Introduction to the periodic table, States of matter: solid, liquid, gas (examples of water), Introduction to models and their limitations in science teaching.

Course Outcomes: Upon successful completion of this course, the students will be able to:

- Identify the effects of human activities and naturally occurring changes on ecosystems and the consequences of those changes.
- Be able to describe a chemical reaction in the context of a rearrangement of atoms and also in the context of the formation of a new substance with new properties.
- Acquire the knowledge about relationships among force, mass, and motion of an object or system.

Recommended Books:

1. Fullick, S. Cambridge Lower Secondary Complete Biology: Student Book. Second Edition. 2021. OUP Oxford.

2. Mukherji. S. Encyclopedia of General Science for General Competitions. 2021. Arihant Publication.

3. Urry, L.A., Campbell, N.A., Campbell biology: 2021. Australian and New Zealand version. Pearson Australia.
4. Callister Jr, W.D. and Rethwisch, D.G., Fundamentals of materials science and engineering: an integrated approach. 2020. John Wiley & Sons.
5. Campbell, N.R., Foundations of science. 2020. BoD–Books on Demand.
6. Fowler, S., Roush, R. and Wise, J. Concepts of biology. ., 2018. OpenStax College, Rice University.

47. Biodiversity of Animal Life

Course Title: Biodiversity of Animal Life	**Course Code: ZOL-302**
Course Structure: Lectures: 2, Labs: 1	**Credit Hours: 3**
Prerequisites: None	

Course Objective: The objectives of the course are:

• To provide the knowledge of evolutionary/phylogenetic relationship (from simple to the complex organisms).

• To impart the basic taxonomic characteristics and classification of all the invertebrate phyla.

• To provide understanding of body organization, Feeding and Digestive system; Other Organ System.

Course Outline:

Classification of animal kingdom, Definition of classification, Major division invertebrates and vertebrates; Classification of invertebrates. Phylum protozoa including general features, classification of Ameoba, Paramecium, Volvox and chlamydomonas. Phylum Porifera; some general features, classification including important species; Sycon, Spongilla, Euplectella, Spongia. Phylum Coelentrates; some general features, Classification including important species; Hydra, Obelia, Physalia, Aurilaaurita, Metridium. Phylum Platyhelminthes; some general features, classification including Planaria, Liver fluke and tapeworm. Phylum Aschelminthes; some general features, classification upto orders. Classes; 1. Gastrotricha, 2. Rotifera, 3.Nematoda with examples. Phylum Annelida; general features, classification: Class Polychaeta, Class Oligochaeta, Class Hirudinea. Phylum Mollusca; general features, classification: classes; 1. Amphineura, 2.gastropoda,3. Pelecypoda,4.Scaphopoda, 5. Cephalopoda. Phylum Arthropoda: some general features, classification: Class Crustaceans, Class Insecta, Class Chilopoda, Class Diplopoda, Class Arachnids with examples. Phylum Echinodermata (General features; classification).

Course Outcomes: Upon successful completion of this course, the students will be able to:

- Acquire the basic concepts of invertebrates with explanation of evolutionary origin and diversification.
- Understand invertebrate organismal concepts in laboratory and field.
- Demonstrate major evolutionary innovations for invertebrates with functional importance.

Practical:

- Study of Ameoba, Paramecium, Volvox and chlamydomonas 2.
- Study of representatives of classes of Phylum Porifera.
- Study of principal representatives of classes of Phylum Coelenterate.
- Study of principal representatives of classes of Phylum Platyhelminthes.
- Study of representatives of phylum Rotifer, Phylum Nematode.
- Study of principal representatives of classes of Phylum Mollusca.
- Study of principal representatives of classes of Phylum Annelida.
- Study of principal representatives of classes of groups of Phylum Arthropoda
- Study of representatives of classes of phylum Echinodermta.

Recommended Books:

1. Schierwater, B. and DeSalle, R., Invertebrate zoology: A tree of life approach. 2021. CRC press.
2. DeSalle, R. and Schierwater, B., Invertebrates And Information. 2021. Invertebrate Zoology: A Tree of Life Approach, p.9.
3. Ray, S., Diarte-Plata, G. and Escamilla-Montes, R. Invertebrates: Ecophysiology and Management. eds., 2020. BoD–Books on Demand.
4. Hickman, C.P., Roberts, L.C/, AND Larson, A., Integrated Principles of Zoology, 15th Edition (International), 2018. Singapore: McGRAW Hill.
5. Pechenik, J.A., BIOLOGY OF INVERTEBRATES, 7th Edition, 2015. (International), Singapore: McGraw Hill.
6. Kotpal, R.L., Modern text book of Zoology: Invertebrates. 2012. Rastogi Publications.

48. Essentials of Biology

Course Title: Essentials of Biology	**Course Code: ZOL-401**
Course Structure: Lectures: 3, Labs: 0	**Credit Hours: 3**
Prerequisites: No	

Course Objective: The objectives of the course are:

- To explain the basic concepts of cell biology
- To understand cellular structure, composition of the organelles, cell growth and cellular division.

- To explain how macromolecules and organelles govern the dynamic organization, function of living cells.

Course Outline: Biology and its major fields of specialization, The Cell: Emergency and Implication of Cell Theory, Organelles of cell. Biological Molecules: Protein, carbohydrates, lipids and nucleic acids i.e DNA and RNA, Mechanism of Enzymes action and factors affecting enzymatic activity. Chromosomes and DNA: Types and composition of chromosomes, Chemical nature of DNA and gene, DNA duplication, Transcription and translation (protein synthesis), Mutation. Cell Cycle and Cell division: Mitosis and Meiosis, Variation and Genetics, definition of Alleles, Gene pool, Law of segregation, Law of independent Assortment and sex Determination. Bioenergetics: Difference Between Photosynthesis and Respiration, Light and Dark Reactions Aerobic and anaerobic Respiration and glycolysis, Kreb's Cycle and Electron Transport Chain. Biotechnology: Gene cloning, Analyzing DNA (polymerase chain reaction) and biotechnology products, Gene therapy and gene culture. Variety of life: General Characteristics of: Kingdom Prokaryota, Kingdom Protista, kingdom Fungi, Kingdom Plantae, Kingdom Animalia. The concept of Homeostasis: Osmoregulation in plants and animals, Excretion in animals, Thermoregulation in animal, Growth and Development in plants and animals, Reproduction in plants and animals, Plant Movements and Plant Hormones, Coordination in Animals. Evolution: Evolution and its theories, Speciation. Ecosystem and energy flow: Major ecosystems, Biochemical cycles, Man and his environment, Renewable and non-renewable resources, Degradation and Depletion of resources, Global Warming and Conservation biology.

Course Outcomes: Upon successful completion of this course, the students will be able to:

- Acquire the basic knowledge of levels of organization in life
- Understand the metabolic processes of cells in terms of cellular organelles, membranes, and biological molecules.
- Ability to understand the role of macromolecules regulating cellular processes.

Recommended Books:

1. Hunter, G.W., 2023. Essentials of biology are presented in problems. BoD–Books on Demand.
2. Pollard, T.D., Earnshaw, W.C., Lippincott-Schwartz, J. and Johnson, GCell biology ., 2022. E-book. Elsevier Health Sciences.
3. Mader, S.S., Windelspecht, M. and Cox, D., Essentials of biology. 6th Edition. 2021. McGraw-Hill higher education.
4. Slack, J.M. and Dale, LEssential developmental biology. ., 2021. John Wiley & Sons.
5. Gunn, AEssential forensic biology. 2019. John Wiley & Sons.
6. Alberts, B., Bray, D., Hopkin, K., Johnson, A.D., Lewis, J., Raff, M., Roberts, K. and Walter, P., Essential cell biology. 2015. Garland Science.
7. Hoefnagels, M., Biology concepts and investigations. 2015. Energy.