

**Scheme of Studies Associate Degree in Biotechnology  
(For Affiliated Colleges)**

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-1	URCG-5118	Functional English	3(3-0)	Nil
GE-2	URCG-5105 URCG-5126	Islamic Studies (OR) Religious Education/Ethics	2(2-0)	Nil
GE-3	URCG-5123	Applications of Information and Communication Technologies (ICT)	3(2-1)	Nil
GE-4	URCG-5111	Translation of Holy Quran	NC	Nil
Major-1	BIOT-5101	Introduction to Biotechnology	3(3-0)	Nil
Major-2	BIOT-5102	Animal Physiology	3(2-1)	Nil
Major-3	BIOT-5103	Ecology, Biodiversity and Evolution	3(3-0)	Nil

Semester Total Credit Hours: 17

**Semester-II**

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-5	URCG-5112	Fables, Wisdom and EPICS	2(2-0)	Nil
GE-6	URCG-5116	Science of Society-I	2(2-0)	Nil
GE-7	URCG-5120	Exploring Quantitative Skills	3(3-0)	Nil
GE-8	URCG-5127	Seerat of the Holy Prophet (SAW)	1(1-0)	Nil
Major-4	BIOT-5104	Cell Biology	3(2-1)	Nil
Major-5	BIOT-5105	Biochemistry-I	3(2-1)	Nil
Major-6	BIOT-5106	Classical Genetics	3(3-0)	BIOT-5103

Semester Total Credit Hours: 17

**Semester-III**

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-4	URCG-5111	Translation of Holy Quran	NC	Nil
GE-9	URCG-5119	Expository Writing	3(3-0)	Nil
GE-10	URCG-5121	Tools for Quantitative Reasoning	3(3-0)	Nil
GE-11	URCG-5122	Ideology and Constitution of Pakistan	2(2-0)	Nil
Major-7	BIOT-5107	Molecular Biology	3(3-0)	BIOT-5104
Major-8	BIOT-5108	Biochemistry-II	3(2-1)	BIOT-5105
Major-9	BIOT-5109	Research Methodology and Skills Enhancement	3(3-0)	Nil

Semester Total Credit Hours: 17



### Semester-IV

<b>Category</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Pre-Requisite</b>
GE-12	URCG-5115	The science of Global Challenges	3(2-1)	Nil
GE-13	URCG-5124	Entrepreneurship	2(2-0)	Nil
GE-14	URCG-5125	Civics and Community Engagement	2(2-0)	Nil
Major-10	BIOT-5110	Immunology	3(3-0)	Nil
Major-11	BIOT-5111	Microbiology	3(2-1)	Nil
Major-12	BIOT-6112	Methods in Molecular Biology	3(2-1)	Nil

Semester Total Credit Hours: 16

The course aims at providing understanding of a writer's goal of writing (i.e. clear, organized and effective content) and to use that understanding and awareness for academic reading and writing. The objectives of the course are to make the students acquire and master the grammatical academic writing skills. The course would enable the students to develop argumentative writing techniques. The students would be able to logically add specific details on the topics such as facts, examples and statistical or numerical values. The course will also provide insight to convey the knowledge and ideas in an objective and persuasive manner. Furthermore, the course will also enhance the students' understanding of ethical considerations in writing academic assignments and topics including citation, plagiarism, formatting and referencing the sources as well as the technical aspects involved in referencing.

#### *Contents*

1. Developing Analytical Skills
2. Transitional devices (word, phrase and expressions)
3. Development of ideas in writing
4. Reading Comprehension
5. Precis Writing
6. Developing argument
7. Sentence structure: Accuracy, variation, appropriateness, and conciseness
8. Appropriate use of active and passive voice
9. Organization and Structure of a Paragraph
10. Organization and structure of Essay
11. Types of Essays

#### *Recommended Texts*

1. Bailey, S. (2011). *Academic writing: A handbook for international students* (3rd ed.). New York: Routledge.
2. Eastwood, J. (2011). *A Basic English grammar*. Oxford: Oxford University Press.
3. Swales, J. M., & Feak, C. B. (2012). *Academic writing for graduate students: Essential tasks and skills* (3rd ed.). Ann Arbor: The University of Michigan Press.
4. Swan, M. (2018). *Practical English usage* (8th ed.). Oxford: Oxford University Press.

#### *Recommended Readings*

1. Biber, D., Johansson, S., Leech, G., Conrad, S., Finegan, E., & Quirk, R. (1999). *Longman grammar of spoken and written English*. Harlow Essex: MIT Press.
2. Cresswell, G. (2004). *Writing for academic success*. London: SAGE.
3. Johnson-Sheehan, R. (2019). *Writing today*. Don Mills: Pearson.
4. Silvia, P. J. (2019). *How to write a lot: A practical guide to productive academic writing*. Washington: American Psychological Association
5. Thomson, A. J., & Martinet, A. V. (1986). *A Practical English Grammar*. Oxford: Oxford University Press

This course focuses on ideological background of Pakistan. The course is designed to give a comprehensive insight about the constitutional developments of Pakistan. Starting from the Government of India Act, 1935 till to date, all important events leading to constitutional developments in Pakistan will be the focus of course. Failure of the constitutional machinery and leading constitutional cases on the subject. Moreover, students will study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan. It will also cover the entire Constitution of Pakistan 1973. However, emphasis would be on the fundamental rights, the nature of federalism under the constitution, distribution of powers, the rights and various remedies, the supremacy of parliament and the independence of judiciary

### *Content*

- 1- Ideology of Pakistan
  - Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.
  - Two Nation Theory and Factors leading to Muslim separatism.
- 2- Constitutional Developments
  - Salient Feature of the Government of India Act 1935
  - Salient Feature of Indian Independence Act 1947 Objectives Resolution
  - Salient Feature of the 1956 Constitution
  - Developments leading to the abrogation of Constitution of 1956
  - Salient features of the 1962 Constitution
  - Causes of failure of the Constitution of 1962
  - Comparative study of significant features of the Constitution of 1956, 1962 and 1973
- 3- Fundamental rights
- 4- Principles of policy
- 5- Federation of Pakistan
  - President Parliament
  - The Federal Government
- 6- Provinces
  - Governors
  - Provincial Assemblies
  - The Provincial Government
- 7- The Judicature
  - Supreme Court
  - High Courts
  - Federal Shariat Courts Supreme Judicial Council
  - Administrative Courts and tribunals
- 8- Islamic Provisions in Constitution
- 9- Significant Amendments of Constitution of Pakistan 1973

### *Recommended Books*

1. Constitutional and Political History of Pakistan by Hamid Khan
2. Mahmood, Shaukat and Shaukat, Nadeem. Constitution of the Islamic Republic of Pakistan, 3rd re edn. Lahore: Legal Research Centre, 1996.
3. Munir, Muhammad. Constitution of the Islamic Republic of Pakistan: Being a Commentary on the Constitution of Pakistan, 1973. Lahore, Law Pub., 1975.

*Recommended readings*

1. Rizvi, Syed Shabbar Raza. Constitutional Law of Pakistan: Text, Case Law and Analytical Commentary. 2nd re edn. Lahore: Vanguard, 2005.
2. The Text of the Constitution of the Islamic Republic of Pakistan, 1973 (as amended).
3. Fundamental Laws of Pakistan by A.K. Brohi

## URCM-5112 Fables, Wisdom Literature, and Epics

2(2+0)

This course has three components containing both readings and related activities: The first component is about fables—that is, stories with animal characters having human attributes. The second component concerns wisdom literature and looks specifically at some of the stories, both in prose and poetry, of the famous Persian literary figure Sa‘di. We shall introduce this author to you. The third component is on the world’s largest epic—the Shāhnāma (Book of Kings) of another literary giant, Firdausi.

### Contents

#### 1- Fables

- Kalīla wa Dimna or The Fables of Bidpai
  - a) The Lion and the Bull, or the emblem of two friends whom a liar contrives to disunite.
  - b) Investigation of the conduct together with the defence of Dimna.
  - c) The Ring-dove, or the emblem of sincere friends.
  - d) The Owls and the Crows, or the danger of being deceived by an enemy
- Bāng-i Darā or The Call of the Marching Bell
  - 1. ایک مکڑا اور مکھی
  - 2. ایک پہاڑ اور گلہری
  - 3. ایک گائے اور بکری
  - 4. ایک فریاد
  - 5. ایک پرندہ اور جگنو
  - 6. جگنو
  - 7. دریا موج

#### 2- Wisdom Literature

- GULISTĀN-E SA‘DĪ
  - a) Those who make an effort to display their virtues, do the same to conceal their vices
  - b) The foundation of injustice in the world began with small unjust deeds
  - c) Burden bearing oxen and asses are better than oppressors
  - d) The pain you give to others eventually finds its way back to you
  - e) Power and riches cannot exalt one in status
  - f) The fleeting moment of an angry decision has everlasting consequences
  - g) A pair of hands working at one’s will are better than those clasped in obedience, waiting for orders
  - h) It is fruitless to celebrate the death of an enemy as one will never be spared from it either
  - i) Destruction of the good names of the departed cannot protect your own
  - j) Do not turn away from knowledge even if one has to get it from the teachings of the ignorant

#### 3- Epics

- SAHNAMA
  - a) Rustam and Sohrab

### Recommended Texts

5. John T. Platts, *The Gulistan; or, Rose Garden of Shaikh Muslihu‘dDīn Sa‘dī of Shīrāz* (London: Wm. II. Allen, 1876)
6. Wheeler Thackston, *A Millennium of Classical Persian Poetry* (Maryland: Ibex Publishers, 2000), 5-8.

This course prepares undergraduates to become successful writers and readers of English. The course helps students develop their fundamental language skills with a focus on writing so that they can gain the confidence to communicate in oral and written English outside the classroom. The course is divided into five units and takes a Project-based Learning approach. Unit themes target the development of 21<sup>st</sup> century skills and focus on self-reflection and active community engagement. The course completion will enable the students to develop communication skills as reflective and self-directed learners. They will be able to intellectually engage with different stages of writing process, and develop analytical and problem-solving skills to address various community-specific challenges.

#### *Contents*

1. Self-Reflection
  - Introduction to the basics of the writing process
  - Introduction to the steps of essay writing
  - Prewriting activities: Brainstorming, listing, clustering and freewriting
  - Practicing Outlining of the essay
2. Personalized Learning
  - Learning Process, Learning Styles, Goal Setting and Learning Plan
3. Oral Presentation
  - Structure and Significance, Content Selection and Slide Presentation, Peer Review
4. Critical Reading Skills
  - Introducing Authentic Reading (Dawn and non-specialist academic books/texts)
  - Reading Strategies and Practice: Skimming, scanning, SQW3R, Annotating, Detailed reading and note-taking, Standard Test Practice: TOEFL and IELTS, Model Review Reports and Annotated Bibliographies
5. Community Engagement
  - Student-led brainstorming on local versus global issues, Identifying research problems
  - Drafting research questions, Drafting interview/survey questions for community research (in English or L1)
  - Engaging students in Critical reading, Presenting interview/ survey information, Field work
  - Writing Community Engagement Project
6. Letter to the Editor
  - Types of letters, Format and purpose of letter to the editor, Steps in writing letter-to-editor

#### *Recommended Texts*

1. Bailey, S. (2011). *Academic writing: A handbook for international students* (3rd ed.). New York: Routledge.
2. Swales, J. M., & Feak, C. B. (2012). *Academic writing for graduate students: Essential tasks and skills* (3<sup>rd</sup> ed.). Ann Arbor: The University of Michigan Press.

#### *Recommended Readings*

1. Cresswell, G. (2004). *Writing for academic success*. London: SAGE.
2. Johnson-Sheehan, R. (2019). *Writing today*. Don Mills: Pearson.
3. Silvia, P. J. (2019). *How to write a lot: A practical guide to productive academic writing*. Washington: American Psychological Association.



*Introductory/compulsory foundation course*

Islamic Studies engages in the study of Islam as a textual tradition inscribed in the fundamental sources of Islam; Qur'an and Hadith, history and particular cultural contexts. The area seeks to provide an introduction to and a specialization in Islam through a large variety of expressions (literary, poetic, social, and political) and through a variety of methods (literary criticism, hermeneutics, history, sociology, and anthropology). It offers opportunities to get fully introductory foundational bases of Islam in fields that include Qur'anic studies, Hadith and Seerah of Prophet Muhammad (PBUH), Islamic philosophy, and Islamic law, culture and theology through the textual study of Qir'an and Sunnah..

- To make students understand the relevance and pragmatic significance of Islam in their lives.
- To make learners comprehend the true spirit of Islam with reference to modern world.
- To generate a sense of Islamic principles as a code of living that guarantee the effective solutions to the current challenges of being.
- To provide Basic information about Islamic Studies
- To enhance understanding of the students regarding Islamic Civilization
- To improve Students skill to perform prayers and other worships
- To enhance the skill of the students for understanding of issues related to faith and religious life.

*Contents*

## Introduction to Qur'anic Studies

- 1) Basic Concepts of Qur'an
- 2) History of Quran
- 3) Uloom-ul-Quran

مطالعہ قرآن (تعارف قرآن ، منتخب آیات کا ترجمہ و تفسیر: سورة البقرہ آیات 1-5، 482-482؛ سورة الحجرات آیات 1-18؛ سورة

النرقان آیات 26-77؛ سورة المومنون آیات 1-11؛ سورة الحزاب آیات 2، 41، 64-66؛ 24، 52- سورة النعام آیات - 151؛ 55

156؛ سورة الصف آیات 1-12؛ الحشر آیات 18-44؛ آل عمران آیات 154-154؛ النحل آیات 14-12؛ لقمن آیت 44، حم آیت 56)

## Introduction to Sunnah

- 1) Introduction of Hadith
- 2) Legal Status of Hadith
- 3) History of the compilation of Hadith
- 4) Kinds of Hadith

حدیث کا تعارف، حدیث کی دینی حیثیت، حفاظت و تدوین حدیث، حدیث کی اقسام

مہن، حدیث: 1 درج ذیل موضوعات پر احادیث کا مطالعہ

- 1- اعمال کا اجر و نوبت پر مہر و حصر ہے۔ 4- بہترین انسان قرآن کا طالب علم اور اس کا معلم ہے۔ 6- کتا ب و سنت گمراہی سے بچنے کا ذریعہ ہے۔ 2- ارکان اسالم 5- اسالم ، ایمان ، احسان اور نواہت کی نشانیاں، 2- بچوں کی نماز کی ٹیٹن 7- دین کا گہرا نعم بلا کی خاص عنایت ہے 8- حصول علم، نالو ت قرآن اور عمل کی اہمیت و 5- روز محشر کا محاسبہ، 14- حقوق بلا کے ساتھ ساتھ حقوق فضیلت،

العباد کا لحاظ رکھنا بھی الزم ہے 11۔ حسن خلق کی عظمت اور فحش و بد گوئی کی مذمت 14۔ دنیا و آخرت کی بہالی کی ضامن چار چیزیں، 16۔ مالک کر دینے والی سات چیزیں، 12۔ بے عمل بہاگ کا عبرت ناک انجام 15۔ ہر شخص نگران ہے اور ہر شخص مسئول

- 1) Sirah of the Prohet
- 2) Importance of the Study of Sirah
- 3) Character building method of the Prohet

(سیرت النبی ﷺ) مطالعہ سیرت کی ضرورت و اہمیت، نغمہ سیرت و شخصیت کا نبوی اور عملی نمونے، اقامت دین کا مزاج

نبوی طریق کار، اقامت دین بعدِ خالنت، مہنق مدینہ، خطبہ حجۃ الوداع، اخالق تعلیمات، تشکیل اجتماعیت اور اسوہ حسنہ

قرآن مجید میں سیرت سرور عالم کا بیان، غزوا  
ت نبوی ﷺ کے مقاصد و حکمتیں  
Islamic Culture & Civilization

- 1) Basic Concepts of Islamic Culture & Civilization
- 2) Historical Development of Islamic Culture & Civilization
- 3) Characteristics of Islamic Culture & Civilization
- 4) Islamic Culture & Civilization and Contemporary Issues

2. اسالمی تہذیب و تمدن (اسالمی تہذیب کا مفہوم، اسالمی کے عوامل و عناصر، اسالمی تہذیب کی خصوصیات، اسالمی تہذیب، علم، معاشرتی اور سماجی اثرات، تہذیبوں کے تصادم کے نظریے کا ترقیدی جائزہ، تہذیبی تصادم کے اثرات و نتائج، طبعی، حیاتیاتی اور معاشرتی علوم میں مسلمانوں کا کردار، نامور مسلمان سائنسدان)

*Pre-Requisite: Nil*

*Recommended Books*

- 1) Hameed ullah Muhammad, —Emergence of Islam|| , IRI, Islamabad
- 2) Hameed ullah Muhammad, —Muslim Conduct of State
- 3) Hameed ullah Muhammad, \_Introduction to Islam
- 4) Ahmad Hasan, —Principles of Islamic Jurisprudence|| Islamic Research, Institute, International Islamic University, Islamabad (1993)
- 5) Dr. Muhammad Zia-ul-Haq, —Introduction to Al Sharia Al Islamia|| Allama Iqbal Open University, Islamabad (2001)
- 6) Dr. MuhammadShahbaz Manj, Teleemat-e- Islam

1. Meaning and Scope of Ethics.
2. Relation of Ethics with:
  - (a) Religion
  - (b) Science
  - (c) Law
3. Historical Development of Morality:
  - (a). Instinctive Moral Life.
  - (b). Customary Morality. (c). Reflective Morality.
4. Moral Theories:
  - (a). Hedonism (Mill) (b). Intuitionism (Butler)
  - (c). Kant's Moral Theory.
5. Moral Ethics and Society.
  - (a). Freedom and Responsibility. (b). Tolerance
  - (c). Justice
  - (d). Punishment (Theories of Punishment)
6. Moral Teachings of Major Religions:
  - a). Judaism
  - b). Christianity c). Islam
7. Professional Ethics:
  - a). Medical Ethics b). Ethics of Students
  - c). Ethics of Teachers d). Business Ethics

#### REFERENCE BOOKS:

1. William Lille. An Introduction to Ethics., London Methuen & Co. latest edition.
2. Titus, H.H. Ethics for Today. New York: American Book, latest edition.
3. Hill, Thomas. Ethics in Theory and Practice. N.Y. Thomas Y. Crowel, latest edition
4. Ameer Ali, S. The Ethics of Islam. Culcutta: Noor Library Publishers, latest edition
5. Donaldson, D.M. Studies in Muslim Ethics. London: latest edition. 6. Sayeed, S.M.A.(Tr.) Ta'aruf-e-Akhlaqiat. Karachi: BCC&T, Karachi University of



The Civics and Community Engagement course is designed to provide students with an understanding of the importance of civic participation, culture and cultural diversity, basic foundations of citizenship, group identities and the role of individuals in creating positive change within their communities. The course aims at developing students' knowledge, skills and attitudes necessary for active and responsible citizenship. After completing this course, students will be able to Understand the concepts of civic engagement, community development, and social responsibility, rights and responsibilities of citizenship, cultural diversity in local and global context, significance of civic participation in promoting social justice, equity and democracy.

### *Content*

- 1- Introduction to Civics & Community Engagement
  - Overview of the course: Civics & Community Engagement
  - Definition and importance of civics
  - Key concepts in civics: citizenship, democracy, governance, and the rule of law
  - Rights and responsibilities of citizens
- 2- Citizenship and Community Engagement
  - Introduction to Active Citizenship: Overview of the Ideas, Concepts, Philosophy and Skills, Approaches and Methodology for Active Citizenship
- 3- Identity, Culture, and Social Harmony
  - Concept and Development of Identity, Group identities
  - Components of Culture, Cultural pluralism, Multiculturalism, Cultural Ethnocentrism, Cultural relativism, Understanding cultural diversity, Globalization and Culture, Social Harmony,
  - Religious Diversity (Understanding and affirmation of similarities & differences)
  - Understanding Socio-Political Polarization
  - Minorities, Social Inclusion, Affirmative actions
- 4- Multi-cultural society and inter-cultural dialogue
  - Inter-cultural dialogue (bridging the differences, promoting harmony)
  - Promoting intergroup contact/ Dialogue, significance of diversity and its impact
  - Importance and domains of Inter-cultural dialogue
- 5- Active Citizen: Locally Active, Globally Connected
  - Importance of active citizenship at national and global level
  - Understanding community
  - Identification of resources (human, natural and others)
  - Utilization of resources for development (community participation)
  - Strategic planning, for development (community linkages and mobilization)
- 6- Human rights, constitutionalism and citizens' responsibilities
  - Introduction to Human Rights, Human rights in constitution of Pakistan
  - Public duties and responsibilities, Constitutionalism and democratic process
- 7- Social Institutions, Social Groups, Formal Organizations and Bureaucracy
  - Types of Groups, Group identities, Organizations
  - Bureaucracy, Weber's model of Bureaucracy
  - Role of political parties, interest groups, and non-governmental organizations
- 8- Civic Engagement Strategies
  - Grassroots organizing and community mobilization
  - Advocacy and lobbying for policy change
  - Volunteerism and service-learning opportunities
- 9- Social issues/Problems of Pakistan
  - Overview of major social issues of Pakistani society

## 10- Social Action Project

### *Recommended Books*

1. Kennedy, J. K., & Brunold, A. (2016). *Regional context and Citizenship education in Asia and Europe*. New York: Routledge, Falmer.
2. Henslin, James M. (2018). *Essentials of Sociology: A Down to Earth Approach* (13<sup>th</sup> ed.). New York: Pearson Education
3. Macionis, J. J., & Gerber, M.L. (2020). *Sociology*. New York: Pearson Education

### *Recommended Readings*

1. Glencoe McGraw-Hill. (n.d.). *Civics Today: Citizenship, Economics, and Youth*.
2. Magleby, D. B., Light, P. C., & Nemacheck, C. L. (2020). *Government by the People* (16th ed.). Pearson.
3. Sirianni, C., & Friedland, L. (2005). *The Civic Renewal Movement: Community-Building and Democracy in the United States*. Kettering Foundation Press.
4. Bloemraad, I. (2006). *Becoming a Citizen: Incorporating Immigrants and Refugees in the United States and Canada*. University of California Press.
5. Kuyek, J. (2007). *Community Organizing: Theory and Practice*. Fernwood Publishing.
6. DeKieffer, D. E. (2010). *The Citizen's Guide to Lobbying Congress*. TheCapitol.Net.
7. Rybacki, K. C., & Rybacki, D. J. (2021). *Advocacy and Opposition: An Introduction to Argumentation* (8th ed.). Routledge.
8. Kretzmann, J. P., & McKnight, J. L. (1993). *Building Communities from the Inside Out: A Path Towards Finding and Mobilizing a Community's Assets*. ACTA Publications.
9. Patterson, T. E. (2005). *Engaging the Public: How Government and the Media Can Reinvigorate American Democracy*. Oxford University Press.
10. Love, N. S., & Mattern, M. (2005). *Doing Democracy: Activist Art and Cultural Politics*. SUNY Press.

Since ancient times, numbers, quantification, and mathematics has played a central role in scientific and technological development. In the 21st century Quantitative Reasoning (QR) skills are essential for life as they help to better understand socio-economic, political, health, education, and many other issues an individual now faces in daily life. The skills acquired by taking this course will help the students to apply QR methods in their daily life and professional activities. This course will also change student's attitude about mathematics. It will not only polish their QR skills, but also enhance their abilities to apply these skills.

#### *Contents*

- 1- What is quantitative reasoning?
- 2- Overview of Contributions of Mathematicians especially Muslim scholars
- 3- Different types of standard numbers and their role in practical life scenarios.
- 4- Understanding relationship between parts and whole
- 5- Practical life scenarios involving units and rate
- 6- Unit analysis as a problem-solving tool
- 7- Dealing with very big and small numbers & their applications
- 8- Understanding uncertainty and its applications.
- 9- Money management (profit, loss, discount, taxation, and other scenarios involving percentage)
- 10- Money management in practical life scenarios like investments and federal budget, simple and compound interest
- 11- Saving plans and economy
- 12- Practical scenarios involving expressions
- 13- Equating two expressions in one variable & using it to solve practical problems
- 14- Introduce geometrical objects through architecture and landscape. Dealing with social and economic issues involving geometrical object
- 15- Venn diagrams and their applications

#### *Recommended Texts*

- 1- Bennett, J. & Briggs, W. (2015). *Using and understanding mathematics* (6th Edition). Pearson Education, Limited..
- 2- Aufmann, R., Lockwood, J., Nation, R. & Clegg, D. (2007). *Mathematical thinking and reasoning*. Brooks Cole.

#### *Recommended Readings*

- 1- Blitzer, R. (2014). *Precalculus*. (5th Edition). Pearson Education, Limited.
- 2- Demana, F., Waits, B., Foley, D. & Kennedy, D. (2016). *Precalculus*. (7th Edition). Addison Wesley

This course will introduce students to the study of the modern society, state, law, knowledge and selfhood. While retaining a focus on Pakistani state and society, students will encounter theoretical concepts and methods from numerous social science disciplines, including economics, politics, anthropology, psychology and sociology, and learn to think theoretically by drawing on examples and case studies from our own social context. Students will be introduced to the works of prominent social theorists from both western and non-western contexts. Instruction will include the use of written texts, audio-visual aids and field visits

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- 1- Blitzer, R. (2014). *Precalculus*. (5th Edition). Pearson Education, Limited.
- 2- Demana, F., Waits, B., Foley, D. & Kennedy, D. (2016). *Precalculus*. (7th Edition). Addison Wesley



This course is based on quantitative reasoning 1 course. It will enhance the quantitative reasoning skills learned in quantitative reasoning 1 course. Students will be introduced to more tools necessary for quantitative reasoning skills to live in the fast paced 21st century. Students will be introduced to importance of mathematical skills in different professional settings, social and natural sciences. These quantitative reasoning skills will help students to better participate in national and international issues like political and health issues. This course will prepare the students to apply quantitative reasoning tools more efficiently in their professional and daily life activities. This course will help them to better understand the information in form of numeric, graphs, tables, and functions

### *Content*

- 1- Investigating relationships between variable
- 2- Exploring tools to find relationship between variables, Resources, and population growth: dealing with economic, environmental, and social issues
- 3- Graphical and analytical approaches to solve a problem
- 4- Applications of graphical & analytical approaches to solve social & economic problems
- 5- Understanding inequalities around us
- 6- Dealing with practical problems involving inequalities in different disciplines
- 7- Golden ratio in sculptures
- 8- Comparison of statements and their use in social and economic problems
- 9- Sequence
- 10- Survival in the modern World
- 11- Propositions and truth values
- 12- Categorical proposition, and its applications
- 13- Methods to explore and summarize data, drawing graphs and identifying misleading graphs
- 14- Methods to discuss the basic characteristics of any datasets, like finding a most representative value in a data, and methods to measure the amount of spread of a data
- 15- Methods to measure degree of relationship among variables, finally this module includes methods to Count the odds.

### *Recommended Books*

- 1- Using and understanding mathematics, 6th edition by Jeffrey Bennet and William Briggs, published by Pearson USA.
- 2- Mathematical thinking and reasoning 2008 by Aufmann, Lockwood, Nation & Clegg published by Houghton Mifflin company USA.

### *Recommended Readings*

- 1- Pre-Calculus, 6th edition by James Stewart, Lothar Redlin and Saleem Watson published by Brooks/Cole Cengage Learning USA.

This course addresses the unique entrepreneurial experience of conceiving, evaluating, creating, managing, and potentially selling a business idea. The goal is to provide a solid background with practical application of important concepts applicable to the entrepreneurial environment. Entrepreneurial discussions regarding the key business areas of finance, accounting, marketing and management include the creative aspects of entrepreneurship. The course relies on classroom discussion, participation, the creation of a feasibility plan, and building a business plan to develop a comprehensive strategy for launching and managing a new venture.

### *Contents*

1. Background: What is an Organization, Organizational Resources, Management Functions, Kinds of Managers, Mintzberg's Managerial Roles.
2. Forms of Business Ownership: The Sole proprietorship, Partnership, Joint Stock Company
3. Entrepreneurship: The World of the Entrepreneur, what is an entrepreneur? The Benefits of Entrepreneurship, The Potential Drawbacks of Entrepreneurship, Behind the Boom: Feeding the Entrepreneurial Fire.
4. The Challenges of Entrepreneurship: The Cultural Diversity in Entrepreneurship, The Power of "Small" Business, Putting Failure into Perspective, The Ten Deadly Mistakes of Entrepreneurship, How to Avoid the Pitfalls, Idea Discussions & Selection of student Projects, Islamic Ethics of Entrepreneurship.
5. Inside the Entrepreneurial Mind: From Ideas to Reality: Creativity, Innovation, and Entrepreneurship, Creativity – Essential to Survival, Creative Thinking, Barriers to Creativity, How to Enhance Creativity, The Creative Process, Techniques for Improving the Creative Process, Protecting Your Ideas, Idea Discussions & Selection of student Projects.
6. Products and technology, identification opportunities
7. Designing a Competitive Business Model and Building a Solid Strategic Plan: Building a strategic plan, Building a Competitive Advantage, The Strategic Management Process, Formulate strategic options and select the appropriate strategies, Discussion about execution of Students' Project.
8. Conducting a Feasibility Analysis and Crafting a Winning Business Plan: Conducting a Feasibility Analysis, Industry and market feasibility, Porter's five forces model, Financial feasibility analysis. Why Develop a Business Plan, The Elements of a Business Plan, What Lenders and Investors Look for in a Business Plan, Making the Business Plan Presentation.
9. Building a Powerful Marketing Plan: Building a Guerrilla Marketing Plan, Pinpointing the Target Market, Determining Customer Needs and Wants Through Market Research. Plotting a Guerrilla Marketing Strategy: How to Build a Competitive Edge, Feed Back & Suggestions on Student Project, Islamic Ethics for Entrepreneurial Marketing
10. E-Commerce and the Entrepreneur: Factors to Consider before Launching into E-Commerce, Ten Myths of E-Commerce, Strategies for E-Success, Designing a Killer Web Site, Tracking Web Results, Ensuring Web Privacy and Security, Feed Back & Suggestions on Student Project.
11. Pricing Strategies: Three Potent Forces: Image, Competition, and Value, Pricing Strategies and Tactics, Pricing Strategies and Methods for Retailers, The Impact of Credit on Pricing
12. Attracting Venture Capitalist: Projected Financial Statements, Basic Financial Statements, Ratio Analysis, Interpreting Business Ratios, Breakeven Analysis, Feed Back & Suggestions on Student Project,
13. Idea Pitching: Formal presentation, 5-minutes pitch, funding negotiation and launching.

### Recommended Books

1. Scarborough, N. M. (2011). *Essentials of entrepreneurship and small business management*. Publishing as Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458.

### *Recommended Readings*

1. Burstiner, I. (1989). *Small business handbook*. Prentice Hall Press.

## **URCG-5123 Applications of Information Communication Technologies (ICT) 3 (2+1)**

The course introduces students to information and communication technologies and their application in the workplace. Objectives include basic understanding of computer software, hardware, and associated technologies. How computers can be used in the workplace, how communications systems can help boost productivity, and how the Internet technologies can influence the workplace. Students will get basic understanding of computer software, hardware, and associated technologies. They will also learn how computers are used in the workplace, how communications systems can help to boost productivity, and how the Internet technologies can influence the workplace.

### *Contents*

- 2- Introduction, Overview of Information Technology.
- 3- Hardware: Computer Systems & Components, Storage Devices.
- 4- Software: Operating Systems, Programming and Application Software.
- 5- Databases and Information Systems Networks.
- 6- File Processing Versus Database Management Systems.
- 7- Data Communication and Networks.
- 8- Physical Transmission Media & Wireless Transmission Media.
- 9- Applications of smart phone and usage.
- 10- The Internet, Browsers and Search Engines.
- 11- Websites and their types.
- 12- Email Collaborative Computing and Social Networking.
- 13- E-Commerce.
- 14- IT Security and other issues.
- 15- Cyber Laws and Ethics of using Social media.
- 16- Use of Microsoft Office tools (Word, Power Point, Excel) or other similar tools depending on the operating system.
- 17- Other IT tools/software specific to field of study of the students if any.

### *Recommended Book*

- 1- Discovering Computers 2022: Digital Technology, Data and Devices by Misty E. Vermaat, Susan L. Sebok; 17<sup>th</sup> edition.

### *Recommended Readings*

- 1- Computing Essentials 2021 by Timothy J. O'Leary and Linda I. O'Leary, McGraw Hill Higher Education; 26<sup>th</sup> edition.
- 2- Computers: Understanding Technology by Fuller, Floyd; Larson, Brian: edition 2018.

To acquaint students with the basic concepts and significance of biotechnology as it stands today. The subject covers basic scientific knowledge and its application in biotechnology. The course also deals with the major elements of the global significance of biotechnology, the categories of biotechnology processes and products, and in the context of "traditional" vs "modern" biotechnology processes. The key developments in the history of biotechnology and the enabling technologies - fermentation, downstream processing; recombinant methods, analysis and automation, genomics, proteomics, metabolomics will be discussed to provide tools and basic knowledge in order to understand biotechnology. The emerging areas of biotechnology, for example Agricultural Biotechnology, Protein, Forensic Biotechnology, Bioremediation, Aquatic Biotechnology, Regulatory agencies and issues that impact Biotechnology industry will be discussed as well. In addition to that, a provocative and issues in Biotechnology, genetically modified food, genetic testing, embryos for research/human cloning, ethical/legal/social questions & dilemmas will be incorporated.

#### *Contents*

1. Biotechnology- definition and history
2. Foundations of biotechnology and interdisciplinary pursuit
3. Branches and/or applications of biotechnology in medicine and diagnostics
4. Applications of biotechnology in Agriculture (crop yield, resistance against biotic and abiotic factors, food, livestock, fisheries, etc.)
5. Production of biotechnological products, transgenics, microbial etc.
6. Application of biotechnology in environment
7. Applications of biotechnology in industry etc.
8. Safety in biotechnology
9. Public perception of biotechnology
10. Biotechnology and ethics
11. Use of modern biotechnology
12. Biotechnology and the developing world

#### *Recommended Texts*

1. Thieman, W.J. & Palladino, M.A. (2014). *Introduction to biotechnology*. Edinburgh Gate UK: Pearson Education Limited.
2. Daugherty, E. (2012). *Biotechnology: Science for the New Millennium*, 1<sup>st</sup> Edition, Revised, USA: Paradigm Publication.

#### *Suggested Readings*

1. Smith, J.E. (2012). *Biotechnology*, 5th Edition, UK: Cambridge University Press.
2. Nicholl, T.S.D. (2012). *An Introduction to Genetic Engineering*, 2nd Edition, UK: Cambridge University Press .
3. Ratlegde, C. and Kristiansen, B. (2006). *Basic Biotechnology*, 2nd Edition, UK: Cambridge University Press.
4. Thomas, J.A. and Fuchs, R.L. (2002). *Biotechnology and Safety Assessment*, 3rd Edition, UK: Academic Press.

The major aims of this course are to provide students with a basic understanding of the fundamental processes and mechanisms that serve and control the various functions of the body. To familiarize students with the principles and basic facts of Animal Physiology and with some of the laboratory techniques and equipment used in the acquisition of physiological data. The emphasis will be on mammalian physiology but there will be some coverage of other vertebrate taxa. The course will focus on organ-system physiology, however, cellular and molecular mechanisms will be discussed in order to present a current view of physiological principles. Furthermore, emphasis will be placed on nervous, muscular, cardiovascular, respiratory, renal, digestive, and endocrine physiology. Where appropriate, basic chemical and physical laws will be reviewed in order to enhance and to promote student understanding. This course provides comprehensive introduction to students on Homeostasis, Biomembranes, Skins, Physiology of Muscles and skeletons etc.

#### *Contents*

1. Introduction. Homeostasis. Biomembranes.
2. Skins, Physiology of Muscles and Skeletons: protection, support and movement
3. The Nervous System: spinal and cranial nerves, neurons, membrane potentials and nerve transmission; senses and sensory receptors
4. Endocrine Glands and their Hormone Messengers, Chemistry of hormones and mechanism of hormone action, Hormonal system of invertebrates and vertebrates
5. Cardiac physiology; introduction to cardiac cycle, vertebrate & invertebrate. Cardiovascular system; introduction, solute exchange, blood pressure. of vertebrates and invertebrates
6. Immune and Lymphatic Systems of vertebrates, Respiratory system; introduction, gas exchange & transport, control, Nutrition and the Digestive System
7. Urine, Reproduction in Animals. Extra renal osmoregulatory organs, Fluid and acid-base balance; Metabolic fates of nutrients in heterotrophs.

#### *Practicals*

Dissection of frog and study of digestive, reproduction, arterial, venous and respiratory system. Blood cells. Dissection of pigeon and study of its various systems. Dissection of mouse and study of various systems. Study of Nervous tissue (brain) of Mammals.

#### *Recommended Texts*

1. Richard, W., Gordon, A., & Margaret, A. (2004). *Animal Physiology*. (1<sup>st</sup> Ed.). New York: Mc Graw Hill Inc
2. Guyton, (2001). *Texts book of medical physiology*. (9<sup>th</sup> ed.). New York: Mc Graw Hill Inc

#### *Suggested Readings*

1. Kent, G.C., & Miller, S. (2001). *Comparative anatomy of vertebrates*. New York: McGraw Hill Inc
2. Campbell, N.A. (2016). *Biology*. (11<sup>th</sup> Ed.). California: Benjamin/Cummings Publishers, Inc

This course aims to introduce students to the fundamentals of ecology, biological diversity and evolution – key areas that are pertinent to modern day biology. The course also aims to provide an introduction to the properties of life and cells leading to genetic and biological diversity. The objective of this course is to describe the molecular and structural unity of life and to explain how the diversity of living things is generated and perpetuated, and exemplify this diversity among and within life's three domains. After going through this course the students would be able to enhance their knowledge of biological diversity with emphasis on variation leading to natural selection. The course also describes the basic properties of populations and interactions among different types of organisms within an ecosystem. The course also demonstrates the fundamental processes underlying adaptive evolution, speciation and extinction, population growth and regulation, species coexistence, and maintenance of biodiversity.

### *Contents*

- 1 An Introduction to ecology and the biosphere,
- 2 History of life, The Origin of Species, how do new species Form, models of speciation;
- 3 What Determines the distribution of life on earth
- 4 Factors that influence earth's climate.
- 5 Energy flow and nutrient cycling in ecosystems
- 6 Population ecology, Population growth and regulation
- 7 community ecology, Community Interactions
- 8 Ecosystems and restoration ecology
- 9 Conservation biology and global change
- 10 Conserving earth's biodiversity
- 11 Importance of biodiversity and major threats to biodiversity
- 12 Factors effecting biodiversity
- 13 Sustainability essential for a healthy future, causes and consequences of extinction.
- 14 Impact of environment on loss of genetic diversity and speciation; *in situ* and *ex situ* conservation.
- 15 Major groups of plants, Colonization of plants on land
- 16 Evolution of seed plants, Major adaptations in plants, domestication and improvement of crops
- 17 Diversity of animal kingdom: Invertebrates and Vertebrates.

### *Recommended Texts*

1. Audesirk, T., Audesirk, G., Byers, B.E. (2017). *Biology: Life on earth*. (11<sup>th</sup> Ed). New Jersey, USA: Pearson Hoboken
2. Campbell, N.A. (2016). *Biology*. (11<sup>th</sup> Edition). California, USA: Benjamin/Cummings Publishing Company

### *Suggested Readings*

1. Aston, et al. (2004). *Ecological Genetics: Planning and application*. UK: Blackwell Science
2. Costa, L.G., & Eaton, D.L. (2006). *Gene-Environment interactions: Fundamentals of ecogenetics*. (1<sup>st</sup> Ed.). NJ: John-Wiley & Sons
3. Louis, P., & Pojman, L.P. (2007). *Environmental ethics: Readings in theory and application*. (5<sup>th</sup> Ed.). Belmont: Wadsworth Publishing

This course will introduce to foundation theories, concepts and practices in biology. Cell biology is study of the structure and function of prokaryotic and eukaryotic cells. In this course we will focus on Eukaryotic cells (Animals, Plants) and will cover topics such as membrane structure and composition, transport and trafficking. The cytoskeleton and cell movement, the breakdown of macromolecules, and generation of energy and integration of cells into tissues. We will also cover important cellular processes such as cell cycle regulation as mitosis and meiosis, signal transduction, functions of different compartments and the overall structure/ultrastructure of cells. The isolation, structure, location, and functions of different cellular organelles will be discussed including Endoplasmic Reticulum, Golgi complex/Golgi apparatus, Lysosomes, Mitochondria, power house of cell, Microbodies, Nucleus, as well as visualized by electron microscopy. The development of critical thinking processes and proficiency in scientific reading and writing will be emphasized throughout the course.

#### *Contents*

1. Introduction to cell theory including historical perspective
2. Overview of membrane structure and chemical constituents of the cell
3. Function, isolation and molecular organization of cellular organelles specifically the endoplasmic reticulum DNA replication in prokaryotes and eukaryotes
4. Lysosome, micro-bodies Post transcriptional processing (e.g., RNA splicing, alternative splicing, editing).
5. Mitochondrial ultra-structure and function
6. Composition and structure of membranes
7. Recombination and transposable elements
8. Skin sensors of heat and cold, skin sensors of mechanical stimuli, sonar, smell, taste and vision in vertebrates
9. Membrane receptors and transport mechanisms
10. Structure and function of chromosomes; cell cycle
11. Nucleus, Mitosis and Meiosis
12. Cell movement - structure and function of cytoskeleton, centriole
13. Cilia and flagella

#### *Practicals*

Microscopy and staining techniques; study of prokaryotic, eukaryotic, plant and animal cells; cell structure in the staminal hair of Tradescantia; study of different types of plastids; cellular reproduction; Mitosis: smear/squash preparation of onion roots.

#### *Recommended Texts*

1. Vrema, P.S., (2005). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, Multicolor Edition, India: Chand and Company Ltd.
2. Lodish, *et al.*, (2012). Molecular Cell Biology, 7<sup>th</sup> Edition, New York: W.H. Freeman.

#### *Suggested Readings*

1. Karp., (2002). *Cell and Molecular Biology*, 3rd Edition, New York: John Wiley & Sons.
2. Alberts, *et al.*, (2009). *Essential Cell Biology*, 3rd Edition, New York: Garland Publishers.
3. Cooper, G.M. and Hausman, R.E., (2009). *The Cell: A Molecular Approach*, 5<sup>th</sup> Edition, USA: Sinauer Associates, Inc.



The subject aims to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis, and to enable the students to acquire a specialised knowledge and understanding of selected aspects by means of series of lectures and lab experiments. Through this course the students would be able to acquire fundamental knowledge of the molecules of life (also known as biomolecules) such as nucleic acids, carbohydrates, proteins and fatty acids, as well as their function in the context of a living cell as they provide the body with energy. The students will also become familiar with the biochemical functions of water and buffer inside the cell. The students will also be able to recognize the different classes of enzymes and coenzymes and their role in the biological processes in the body. The students will also get knowledge about hormones in terms of their structure, function and role in regulating the metabolism.

### *Contents*

1. Introduction to biochemistry
2. Water, pH, buffers, and biochemical composition of cells
3. Carbohydrates - structure and classification
4. Proteins - overview with emphasis on their composition and structure
5. Classification and function of proteins
6. Lipids - structure, classification and biological significance
7. Enzymes - properties, nomenclature, classification
8. Factors affecting enzyme activity including inhibitors and potentiators,
9. Basic kinetics, derivation of  $K_m$  and  $V_{max}$ ; coenzymes and vitamins
10. Nucleic acids - structure and function.

### *Practicals*

Standard laboratory operating and safety procedures, Preparation of laboratory solutions, buffers and pH determination; qualitative and quantitative tests for carbohydrates, proteins and lipids; enzyme assays and the effect of pH, temperature and other factors on enzyme activity.

### *Recommended Texts*

1. Nelson, D.L. and Cox, M. M., (2012). *Lehninger principles of biochemistry*, 6<sup>th</sup> Edition, New York: W.H. Freeman.
2. Hames, D. and Hooper, N., (2006). *Instant notes biochemistry*, 3<sup>rd</sup> Edition, USA: Taylor & Francis Group.

### *Suggested Readings*

1. Berg, J., Tymoczko, J. and Stryer, L., (2006) . (Eds), *Biochemistry*, 6<sup>th</sup> Edition, New York: W.H. Freeman and Company.
2. Voet, D. and Voet, T.G., (2008). *Biochemistry*, 4<sup>th</sup> Edition, New York: John Wiley & Sons.
3. Murray, *et al.*, (2012). *Harper's illustrated Biochemistry*, 29<sup>th</sup> Edition, New York: McGraw-Hill Medical Publishing.
4. Ferrier, D.R., (2013). *Lippincott's Biochemistry*, 6<sup>th</sup> Edition, USA: Lippincott Williams & Wilkin Publishing Company.

To acquaint students with classical aspects of genetics. An introduction to the principles of genetics, including topics from classical Mendelian concepts to the contemporary molecular biology of the gene. Upon successful completion of this course, students should be able to demonstrate the following competencies: (1) an understanding of the central theories and methodologies that define the field of genetics and its various sub disciplines (traditional, molecular, and population genetics) and the ability to use the vocabulary that embodies this knowledge; (2) an understanding that science is a continual process of investigation and interpretation and that scientific knowledge progresses via the support and rejection of competing hypotheses, collective decisions that are based on empirical evidence and logical interpretation using inductive and deductive reasoning; (3) the ability to develop a scientifically informed position on some of the bioethical and social issues related to the practice and application of genetics research.

#### *Contents*

1. Classical Mendelian genetics
2. Monohybrid crosses
3. Dominance, recessiveness.
4. Codominance and semidominance
5. Principle of independent assortment;
6. Dihybrid and trihybrid ratios;
7. Gene interactions; epistasis and multiple alleles
8. ABO blood type alleles and Rh factor alleles in humans
9. Probability in Mendelian inheritance
10. Structure of chromosomes
11. Organization of genes and genomes;
12. Nucleic acid function; DNA as warehouse of genetic information
13. Experimental evidence that DNA is genetic material
14. Sex determination, Linkage and crossing over.

#### *Recommended Texts*

1. Snustad, D.P., & Simmons, M.J. (2008). *Principles of Genetics*. (5<sup>th</sup> Ed.). New York: John Willy & Son
2. Klug, W.S., and Cumming, M.R. (2008). *Concepts of Genetics*. (9<sup>th</sup> Ed.). USA: Prentice Hall

#### *Suggested Readings*

1. Pierce, B. (2004). *Genetics: A conceptual approach*. (2<sup>nd</sup> Ed.). New York: W.H. Freeman.
2. Brooker, R., (2011). *Genetics: Analysis and principles*. (4<sup>th</sup> Ed.). USA: McGraw-Hill.
3. Pierce, B.A. (2011). *Genetics: A conceptual approach*. (4<sup>th</sup> Ed.) New York: W.H. Freeman Publisher.

Molecular Biology is the study of biological systems at the molecular level. Molecular Biology deals with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division and development. It is large and ever changing discipline. In this course, students will acquaint with the chemistry and biology of nucleic acid structure (DNA, RNA) and the mechanics of replication, transcription, post transcription modification, translation, post translational modifications in prokaryotes (particularly bacteria) and eukaryotes. The central goal is understanding the gene regulation at all levels both in prokaryotes and eukaryotes. In this course, students will account for causes for DNA damages and genetic changes and explain the different mechanisms that underlie these changes and how cells handle this at the molecular level account for how changes in the genome can result in the different genetic diseases, including cancer diseases and transposable elements will be also discussed.

#### *Contents*

1. Introduction to molecular biology and history
2. Structure and function of DNA
3. Chromatin and structure of chromosomes
4. Protein structure and function
5. DNA replication in prokaryotes and eukaryotes
6. Transcription in prokaryotes and eukaryotes
7. Post transcriptional processing (e.g., RNA splicing, alternative splicing, editing).
8. Translation
9. Post-translational processing in eukaryotes
10. Protein folding, targeting and turnover
11. DNA damage and repair
12. Recombination and transposable elements
13. Signaling and control of gene regulation in prokaryotes
14. Signaling and control of gene regulation in eukaryotes

#### *Recommended Texts*

1. Alberts, B., et al. (2007). *Molecular biology of the cell*. (5<sup>th</sup> ed.). New York: Garland Science.
2. Lodish, H., et al. (2012). *Molecular cell biology*. (7<sup>th</sup> ed.). New York: W.H. Freeman.

#### *Suggested Readings*

1. Berg, J.M., et al. (2006). *Biochemistry*. (6<sup>th</sup> Ed.). New York: W.H. Freeman.
2. Schleif, R. (1993). *Genetics and molecular biology*. (7<sup>th</sup> Ed.). UK: The Johns Hopkins University Press.

This course is a continuation of principles of Biochemistry - I, and aims to familiarize students with the key concepts of intermediary metabolism of proteins, nucleic acids, carbohydrates and lipids. The course also aims to provide knowledge on the principles of thermodynamics and their applications in bioenergetics. This subject will provide an advanced understanding of the core principles and topics of metabolism and to enable students to acquire a specialised knowledge and understanding of selected aspects by means of series of lectures and lab experiments. Special emphasis will be placed on, but not limited, to the biochemical basis of metabolism including the biosynthesis and breakdown of lipids, amino acids, nucleic acids and some important special products derived from amino acids. Through this course the students will also be able to integrate and evaluate biochemical and physiological concepts and mechanisms related to normal healthy states to diseases or pathologic states.

#### *Contents*

1. Introduction to metabolism and basic aspects of bioenergetics and biochemical thermodynamics (endergonic and exergonic reactions)
2. Carbohydrate metabolism and regulation (glycolysis, glycogenolysis; gluconeogenesis; pentose phosphate pathway), Citric acid cycle (reactions, energetics and control)
3. Electron transport chain, oxidative phosphorylation, shuttle mechanisms
4. Lipid metabolism (energy yield from fatty acid oxidation, ketone bodies, acyl glycerol, compound lipids, cholesterol)
5. Photosynthesis; Calvin Cycle
6. Metabolism of nitrogenous compounds (amino acid synthesis, catabolism, purine and pyrimidine synthesis), Nucleic acid metabolism and control
7. Urea cycle and Integration of metabolism

#### *Practicals*

Basic biochemical methods such as iodine test for polysaccharides, fermentation of sugars by Baker's yeast; isolation of amylose and amylopectin from starch; extraction of glycogen from liver; acid and enzymatic hydrolysis of glycogen; extraction and estimation of lipids from plant tissue/seed and lipid separation from different tissues; fractionation by thin layer chromatography (TLC).

#### *Recommended Texts*

1. Nelson, D. L. and Cox, M. M., (2012). *Lehninger Principles of Biochemistry*, 6<sup>th</sup> Edition, New York: W.H. Freeman .
2. Hames, D. and Hooper, N., (2006). *Instant Notes on Biochemistry*, 3<sup>rd</sup> Edition, USA: Taylor & Francis Group.

#### *Suggested Readings*

1. Berg, J., Tymoczko, J. and Stryer, L., (2006). (Eds), *Biochemistry*, 6<sup>th</sup> Edition, New York: W.H. Freeman and Company.
2. Voet, D. and Voet, T.G., (2008). *Biochemistry*, 4<sup>th</sup> Edition, New York: John Wiley & Sons.

This course will familiarize students with various methods and tools used for conducting research and latest trends in the field of biotechnology through reading and understanding scientific literature. Introducing the students to various different types of manuscripts and the methods/steps involved in preparing a good scientific manuscripts, different online tools to find the articles related to the research topic, fetching the valuable information from articles, designing research projects, methods to collect data and interpretation of that data to come to the concluding point. This course will also help the students in learning the important skills to present their scientific knowledge in an effective way by using different techniques like posters and presentations, which are common method used in scientific community to share their knowledge. Introduction and importance of intellectual property rights will also be elaborated to improve the knowledge of students about patenting and securing their research, avoiding the unethical academic practices (Plagiarism) and its severe consequences.

#### *Contents*

1. Introduction; unethical academic practices (plagiarism)
2. Need of research and research types
3. Extraction and review of literature
4. Identifying a research problem and formulating a hypothesis
5. Designing a study; data collection, interpretation and analysis
6. Writing a research report, project, thesis and/or research article or review
7. Preparing posters
8. Making scientific presentations
9. Intellectual property.

#### *Recommended Texts*

1. Bryman, A. (2001). *Social Research Methods*. (2<sup>nd</sup> Edition). New York, USA: Oxford University Press.
2. Awan, J.A. (2003). *Scientific Presentation*. Faisalabad, Lahore: Unitech Communication.

#### *Suggested Readings*

1. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques*. (2<sup>nd</sup> Edition). New Delhi: New Age International Publishers.
2. Durrani, S.A. (2004). *Technical Writing*. Islamabad, Islamabad: Higher Education Commission.
3. Kumar, R. and Kindersley, D. (2010). *Research Methodology: A Step by Step Guide for Beginners*. (3<sup>rd</sup> Edition). Ventura, USA: SAGE Publications.

The purpose of this course is to acquaint students with the basic principles of innate and adaptive immune systems. The multiple roles, functions of immune system, and its consisting of cells and the relation of how this lead to diseases. The course will consider both innate and adaptive immunity and include the structure and function of key receptors including immunoglobulin, T cell receptors and innate pattern recognition receptors. The mechanisms of antibody formation and molecular aspects of cellular immunity including T and B cell interactions and lymphocytes memory formation, will be emphasized, and connections to modern biomedical science will be highlighted. These will include presentations and discussions on autoimmunity, immunity against major microbial pathogens (viruses, bacteria, parasites) transplantation and tumor immunology. Different types of Vaccines including traditional and modern vaccine and their importance as protection from different viral and bacterial pathogen. Types of allergies and how they affect human life.

#### *Contents*

1. Overview of the immune system as the body's main defense mechanism.
2. Elements of innate and acquired immunity
3. Cells and organs of the immune system.
4. Properties of antibodies and antigens together with their structure.
5. Antibody function and interactions
6. Monoclonal and polyclonal antibodies.
7. Genetics of antibody structure and diversity
8. Expression of immunoglobulin genes.
9. Major Histocompatibility complex.
10. T-cell and B-Cell.
11. Complement system
12. Hypersensitivity
13. resistance and immune response to infectious diseases
14. Cell-mediated effector response, leukocyte migration and inflammation
15. Vaccine, Traditional vaccines, Modern Vaccines
16. Autoimmunity
17. Transplantation immunology

#### *Recommended Texts*

1. Kuby, J. (2006). *Immunology*. (6<sup>th</sup> Ed.). New York: WH Freeman
2. Abbas, A.K., & Lichtman, A.H. (2010). *Basic immunology: Functions and disorders of the immune system*. (3<sup>rd</sup> Ed.). Philadelphia: Saunders Publisher

#### *Suggested Readings*

1. Janeway, C.A., et al. (2001). *Immunobiology. The immune system in health and disease*. (5<sup>th</sup> Edition). New York, Garland Science Publisher
2. Anderson, W.L. (1999). *Immunology*. (1<sup>st</sup> Ed.). New Jersey: Wiley-Blackwell.

This course aims to familiarize students with fundamentals of prokaryotic and eukaryotic microbial life including viruses. In this course students will learn about culturing of bacteria, nutritional requirements of microbes and control of microbes. Students will also learn about the importance of microbes in our life. The course also describes how microorganisms are used as model systems to study basic biology, genetics, metabolism and ecology. This course will also help to student about knowledge of antibiotics and their mode of action. Students learning this course will be able to complete a substantial research project related to microbiology; seek and employ insights from others in implementing the project; evaluate a significant challenge or question faced in the project in relation to core concepts, methods or assumptions in microbiology; and describe the effects of learning outside the classroom on his or her research or practical skills.

#### *Contents*

1. Overview and history of microbiology including microbial diversity (Archaea, bacteria, fungi, algae, protozoa)
2. Nutrition and growth of microbes
3. Metabolism of microbes
4. Cultivation of microbes
5. Viruses
6. Control of microorganisms: Sterilization and disinfection,
7. Antimicrobial agents
8. Antibiotics, antibiotic resistance and susceptibility
9. Antifungal and antiviral agents; cell death
10. Symbiosis, Carbon, nitrogen, sulfur and phosphorus cycles
11. Microbiology of soil, Microbiology of freshwater and seawater.

#### *Practicals*

Sterilization techniques; culturing of bacteria in liquid and on solid medium; Gram-staining of bacteria; colony and cell morphology; bacterial cell count and growth curves; biochemical tests.

#### *Recommended Texts*

1. Plczer, M.J., Chan, E.C.S., & Krieg, N.R. (2008). *Microbiology*. (5<sup>th</sup> Ed.). New Dehli: Tata McGraw Hill Publisher
2. Talaro, K.P. (2009). *Foundations in Microbiology: Basic principles*. (7<sup>th</sup> Ed.). NY: McGraw Hill Publisher

#### *Suggested Readings*

- Tortora, G.J., & Funke, B.R. (2016). *Microbiology: An introduction*. (12<sup>th</sup> Ed.). UK: Pearson
1. Alcamo, I.E. (2016). *Fundamentals of Microbiology*. (9<sup>th</sup> Ed.). USA: Jones and Bartlett Publishers
  2. Cappuccino, J.G., & Sherman, N. (2016). *Microbiology: A laboratory manual*. (10<sup>th</sup> Ed.). UK: Pearson Education

This course is designed to identify the fundamental aspects of molecular biology techniques and to apply the principles of molecular methods in a design in order to sense, study or control a biological system. This introductory course will explore the process of doing scientific research in a molecular biology lab. Students will learn numerous techniques in the lab, including DNA isolation, PCR, gel electrophoresis etc. This course is intended for the students with little or no experience in a molecular biology lab, and it will prepare these students for the more advanced molecular lab courses and training. The aim of the course is that the students should assimilate a substantial theoretical basis to understand the key experimental techniques used in modern molecular biology research. Students will also be equipped with theoretical and practical basis for further academic studies or professional practice in areas related to molecular biology.

### *Contents*

1. Solution dilutions, Sterilization techniques,
2. DNA/RNA extraction techniques,
3. Horizontal, vertical, pulse field, denaturing gradient gel electrophoresis;
4. Analysis of proteins by native and SDS-PAGE; 2-D gels;
5. Polymerase chain reaction (PCR) – Types of PCR (inverse, touch-down, nested, hemi-nested, pit stop,
6. Multiplex, reverse transcriptase, RACE, Real-time qPCR, Applications of PCR; Detection of mutations and/or SNPs;
7. Analysis of nucleic acids by gel electrophoresis
8. Enzyme-linked immunosorbant assay; Southern, Western, Northern blotting.
9. Biosensors, Transducers.

### *Practicals*

Preparation of stock and working solutions; isolation of nucleic acids and their quantification; restriction digestion of DNA and preparation of restriction maps; gel electrophoresis, agarose and polyacrylamide gels; polymerase chain reaction (PCR); preparation of chemically competent cells; transformation of bacteria with plasmid DNA.

### *Recommended Texts*

1. Walker, J.M., & Rapley, R. (2008). *Molecular biomethods handbook: Methods in molecular biology*, 2<sup>nd</sup> Ed.). New Jersey, USA: Humana Press.
2. Bartlett, J.M.S., & Stirling, D. (2008). *Methods in Molecular Biology, PCR Protocols*. (2nd Ed.). New Jersey, USA: Humana Press Inc

### *Suggested Readings*

1. Griffiths, A.J.H., Wessler, S.R., Carrol, S.B., & Doebley, J. (2015). *Introduction to genetic analysis*. (11<sup>th</sup> Ed.). USA: W. H. Freeman and company
2. Wink, M. (2011). *An Introduction to molecular biotechnology: Fundamentals, methods, and applications*. (2nd Ed.). USA: Wiley Blackwell
3. Wilson, K., & Walker, J. (2010). *Principles and techniques of biochemistry and molecular biology*. (7<sup>th</sup> Ed.). UK: Cambridge University Press



1.

## Translation of the Holy Quran - I

Topic	Details
Semester/Level	In some discipline 1 <sup>st</sup> semester and in some discipline 2 <sup>nd</sup> Semester/ ADP Program 1 <sup>st</sup> Year
Course Code	URCQ-5111
Course Title	Translation of the Holy Quran – I
Credit Hours	1(0-1)
Objectives	<ul style="list-style-type: none"> <li>• To familiarize the students to keys and fundamentals of recitation of the holy Quran.</li> <li>• To develop the skill of the students of recitation the last revelation.</li> <li>• Students will learn the basic Arabic grammar in a practical way.</li> <li>• To develop an eagerness among the students to explore the last divine Book.</li> </ul>
Course Contents:	<ul style="list-style-type: none"> <li>• نيسوان پارہ - ناظرہ مع تاجويد</li> <li>• بيزادي عربي گرامر</li> <li>• اسم اور اس کے مختلفات : اسم فاعل ، مفعول ، مفعول ، مفعول ، مفعول ، مفعول</li> <li>• اور اس کی اقسام : ماضی ، مضارع ، امر ، زہی</li> <li>• حرف اور اس کی اقسام : حروف عت ، حروف جارہ ، مشبہ بلانفل</li> </ul>
Memorization:	نيسون پارے کی آخري بييس سورتيں ( حفظ مع ترجمہ )

## Translation of the Holy Quran- II

Topic	Details
Semester/Level	In some discipline 3 <sup>rd</sup> semester and in some discipline 4 <sup>th</sup> Semester/ ADP Program 2 <sup>nd</sup> Year
Course Code	URCQ-5111
Course Title	Translation of the Holy Quran – II
Credit Hours	1(0-1)
Objectives	<ul style="list-style-type: none"> <li>▪ Students will come to know about the real nature, significance and relevance of the Islamic beliefs in light of the text of the Holy Quran.</li> <li>▪ Students will seek knowledge of translation and transliteration of the Holy Book Quran.</li> <li>▪ To familiarize the students with the concept of Ibādah (Its significance, scope and relevance) and its types in Islam.</li> <li>▪ Students will learn literal and idiomatic way of translation of the Holy Book.</li> <li>▪ Students will learn about the polytheism and its incompatibility in Islam highlighted by the Holy Quran.</li> <li>▪ To highlight the significance of learning through using all human faculties provided by the almighty Allah and familiarize the students about condemnation of ignorance mentioned in the Quranic text.</li> <li>▪ To develop Awareness among the students about rights and duties of different circles of society in the light of Holy Quran.</li> <li>▪ To introduce the students to Quranic Arabic grammar in practical manner.</li> </ul>

<p>Course Content s:</p>	<ul style="list-style-type: none"> <li>○ ایمانیات اور عبادات</li> <li>بلا پر ایمان، فرشتوں پر ایمان، رسولوں پر ایمان، آسمانی کتابوں پر ایمان</li> <li>یوم آخرت پر ایمان، تکفیر پر ایمان</li> <li>نماز، روزہ، زکوٰۃ، حج، جہاد</li> <li>○ معاشرے کے حقوق</li> <li>خانہ دان کی تکوین •</li> <li>حق مہر •</li> <li>رضاعت و حمل •</li> <li>اوالد کو وٹل کرنے کے ممانعت •</li> <li>شوہر کی نافرمانی •</li> <li>طلاق •</li> <li>بیوہ کی عدت کے احکام •</li> <li>نکاح کا بیخام بھیجنا •</li> <li>عورت کی وراثت (اس کے شوہر کی طرف سے) •</li> <li>والدین کے حقوق •</li> <li>بیویوں اور اوالد کے بیچ عداوت •</li> <li>○ خانہ دان کے حقوق</li> <li>مہمان کی عزت •</li> <li>اجازت طلب کرنے کے اصول •</li> <li>مجلس کے آداب •</li> <li>تعاون اور بھائی چارہ •</li> <li>گروہ بندی •</li> <li>محبت •</li> <li>لوگوں کے درمیان صلح •</li> <li>عفو و درگزر، غصہ پر قابو اور معاف کرنا •</li> <li>شعوب و قبائل •</li> <li>لوگوں کے بیچ اختلافات •</li> <li>حمایت و نگہبازی •</li> </ul>
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## Translation of the Holy Quran - III

Topic	Details
Semester/Level	In some discipline 5 <sup>th</sup> semester and in some discipline 6 <sup>th</sup> Semester/ BS (5 <sup>th</sup> Semester intake) 1 <sup>st</sup> / 2 <sup>nd</sup>
Course Code	URCQ-5111
Course Title	Translation of the Holy Quran – III
Credit Hours	1(0-1)
Objectives	<ul style="list-style-type: none"> <li>• To introduce ethics and highlight its importance, need and relevance for individual and collective life.</li> <li>• To illuminate the students with the Quranic norms of Morality i.e. truthfulness, patience, gratitude, modesty, forgiving, hospitality etc.</li> <li>• To familiarize the students with immoral values like falsify, arrogance, immodesty, extravagance, backbiting etc.</li> <li>• To inculcate ethical and moral values in our youth.</li> <li>• To develop a balanced dynamic and wholesome personality.</li> <li>• To introduce the students to Quranic Arabic grammar in practical manner.</li> </ul>

Course Contents:	<p>○ اخلاق (تعارف، ضرورت و اہمیت، اقسام، معنویت) اخلاقِ حسنہ:</p> <ul style="list-style-type: none"> <li>• برائی کو نیکی سے جٹانا</li> <li>• نیکی کے کاموں میں مسابقت</li> <li>• لوگوں کے درمیان صلح</li> <li>• عدل و انصاف</li> <li>• سچائی</li> <li>• ایثار</li> <li>• سلیم ٹیپ</li> <li>• مہمان نوازی</li> <li>• لغویات سے اعراض</li> <li>• عاجزی و انکساری</li> <li>• نگاہ اور آواز کو بہت رکھنا</li> <li>• چال میں مہازہ روی</li> <li>• شرمگاہوں کی حفاظت</li> <li>• صبر</li> <li>• شکر</li> <li>• امور میں مہازہ روی</li> </ul> <p>○ اخلاقِ برہنہ:</p> <ul style="list-style-type: none"> <li>• ظلم اور زیادتی</li> <li>• غرور و تکبر</li> <li>• نفسانی خواہشات کی پیروی</li> <li>• بیگمانی</li> <li>• جھوٹ</li> <li>• چغلی اور نہمت</li> <li>• تمسخر اور شیخی خوری</li> <li>• لہو و لہب</li> <li>• برے ناموں سے بکارنا</li> <li>• احسان جٹانا اور تکلیف دینا</li> <li>• فضول خرچی اور حد سے بڑھنا</li> <li>• حسد اور تنگ دل</li> <li>• بے پردگی</li> </ul>
Grammar:	<ul style="list-style-type: none"> <li>• قرآنی عربی گرامر کے اصول اور ان کے اطالوات (مہن قرآنی پر اطالق سے توضیحات)</li> </ul>
Details of	<ul style="list-style-type: none"> <li>▪ مہنخب آیات مع ترجمہ و تاجوید</li> </ul>

Chapters and  
verse  
Numbers:

- البقرة (٨٧٧، ٤٥٨، ٣٢، ٨٢٧، ٨١٧، ٨٤٧، ٨١٧، ٨١٧، ٨٤، ٣٤٧، ١١٧، ١٤٨، ٤٨٧، ٨٨٨، ١٨، ١١، ٨٢٧، ٢٥٧، ١٢٧، ٢١٧، ٥٢٨، ٣٢٨، ٨٢٨، ٨٧٨، ١٢، ٧٣٨، ١٧، ٥٣، ٥٨٧، ٢٤٨، ١٨، ٧١، ٣٢، ٢٨٨، ٤٢٧، ٢١)
- آل عمران (٥٤٧، ٥٧، ٥٨، ٤٢٧، ٨٣٧، ٢٥٧، ٥٣٧، ٤٥٧، ١٧، ١١٨، ٤٨٧، ٣٣٧، ٥٧٧، ٥١٧، ٥١٧، ٢٨، ٢١، ٧٥٧، ١٥٧، ٢٤٧)
- النساء (٤٣٧، ٣٨، ٨٨، ٢١٧، ١١٧، ٤١٧، ٥٢، ١٨، ١٨، ٣١٧، ٢٣، ٤٨، ٥٨، ١٥، ٥٨، ١٤)
- المائدة (٢٤، ١٤، ٣٢، ٣٧، ٢، ٧٥، ٢٧)
- النحل (١٢، ٢٨٧، ٤١٧، ٣٧٧، ١٣، ٢٨٧، ٤٨٧)
- الرعد (٢، ٤٨، ١٨، ٥٨، ٨٨)
- العنكبوت (٧٣، ٢٢، ٧٤، ٢٥٧، ١٥، ١٥، ٥، ١٨، ٥٥٧، ٢٢٧، ٤٢، ٧٢)
- القصص (٥٤، ٥٢)
- فصلت (٥٣)
- النعام (٨٢، ١١، ١١، ١٣٧، ٤٤٧، ١٢٧)
- النمل (١٢، ٢٥)
- الحج (١٣، ٢٤، ١٢، ٢٢، ١١)
- الحجرات (٢، ٧٧، ٢، ٧٧، ٣، ٨٧، ٤٧، ١٧)
- الأحزاب (٣٨، ١٤، ٢٤، ٢٤، ٨٤، ٢٤، ٤٤، ٢٤، ٤٣، ٥٨، ٤٣)
- الحشر (٢)
- طه (٨١)
- النعام (٥٢٧، ٧٥٧، ٢٧٧، ٧٤٧، ٣٢، ١٨٧)
- ق (٥٣)
- الزمّل (١٨، ٢٥، ٧٢)
- النّوح (٤٧)
- هود (١٧، ٢٧، ٨٧، ٢٢، ٨٨، ٨٨)
- الفرقان (٣٢، ٧٨، ١٢، ٣٢)
- النور (٣٨، ٢، ٥، ١٣، ٧٣، ٣٣، ٣٣، ٧٢، ٧٣، ٨٨)
- المؤمن (٢، ٣٣، ٢٧، ٨٣، ٢٧)
- السّراء (١٣، ١٧٧، ٤، ١٣)
- المزمل (٢٧)
- المدثر (٢، ٥)
- المدثر (٥١)
- ناظر (٨٣)
- النّوح (٢٨)
- البلد (١٧)
- الزّم (٣، ١٧)
- الحجر (٤٢)
- النجم (٧٣)
- الرّحمن (١٢)
- هود (٢، ٨١٧، ٣)
- الكيف (٨، ٢٤)
- الشورى (١٣)
- غافر (٢٨، ١٨)
- الحديد (١٨، ١٨)
- مريم (٢٢)
- النّازعات (٧٥)
- التّوبه (٤٢، ٥٢، ١١)
- الهمزة (٧)

## Translation of the Holy Quran - IV

Topic	Details
Semester/Level	In some discipline 7 <sup>th</sup> semester and in some discipline 8 <sup>th</sup> Semester/ BS (5 <sup>th</sup> Semester intake) 3 <sup>rd</sup> / 4 <sup>th</sup>
Course Code	URCQ-5111
Course Title	Translation of the Holy Quran - IV
Credit Hours	1(0-1)
Objectives	<ul style="list-style-type: none"> <li>• To familiarize the students with commandments of trade and inheritance mentioned in the Quranic text (with the help of Urdu translation).</li> <li>• Students</li> <li>• To introduce the students to scientific facts and miracles of the Holy Quran and Quranic stress on deep study of Allah's explored universe.</li> <li>• To motivate the students for reading and exploring the last Holy Book revealed by Almighty Allah.</li> <li>• Through memorization students will develop their relation with last revelation.</li> </ul>
Course Contents:	<div style="text-align: right;"> <p>○ تجارت اور وراثت:</p> <p>• مال کی تقسیم</p> <p>• نادان کا مال</p> <p>• عوام الناس کا مال</p> <p>• عورتوں کا مال</p> <p>• بیٹیوں کا مال</p> <p>• کفار کا مال</p> <p>• جائز مال</p> <p>• معاہدے</p> <p>• رہن</p> <p>• قرض</p> <p>○ سائنسی حقائق:</p> <p>• تخلیق کائنات</p> <p>• اجرامِ نلکی</p> <p>• شجر و حجر</p> <p>• زمین و آسمان کے اسرار</p> <p>• ہوائیں اور طوفان</p> <p>• بہائے اور جویشی</p> </div>





verse Numbers:

- ،٤٤٨ ،٢٨ ،٣٨٨ ،١٨ ،٢٧ ،٢١٨ ،٢١٨ ،٤٧٨ ،١١٧ ،٣٢ ،٧١٨ ،٥١٨ ،٨٢٨ ،٨٢٨  
)٣٢ ،٨٢ ،٧١ ،٢٨ ،٢٧ ،١٧٨ ،١٤ ،٥٢٧ ،١٢ ،١٤ ،٥٢٧ ،٥٢٧ ،٢٢٨ ،٥٢٧
- آل عمران (١٧٧، ٥٣٧، ١٣٧، ١٢٧، ١٨، ٢٤)
  - النساء (٢٨، ٨، ٢٨، ٧٢٧)
  - المائدة (٢٢، ٤٢، ٤١، ٢٢، ١٢)
  - التوبة (٢٢، ٥٨، ٢٢، ٥٨، ١٢، ٥)
  - العنكبوت (٨١٧، ٤٢٧، ١٤، ٢٤، ٣٢٧، ٣٢٧، ١٥، ١٢٧، ٣٣٧، ١٥، ٢١٧، ٢٢٧)
  - الرعد (١٧، ٥)
  - الطور (٥٥)
  - النعام (٢٤، ٣٢، ٧٥٧، ٢٥٧، ٢٣)
  - الزلزال (٢٨، ٢٣، ٧٥)
  - الكهف (٧٤، ٢١٧، ١٥، ٨٣، ٤٥، ١٧، ٤٥)
  - الجاثية (٤)
  - ناطر (١٨، ٨٧، ٣٧)
  - العنكبوت (١٨، ٣٢، ٧٥)
  - الروم (١٤)
  - السراء (١١، ٢٢)
  - الرعد (٨)
  - السبا (١٧، ٣، ٨٨)
  - يونس (٢٢، ٧١٧، ٥٨، ٥٨، ٤، ٨٨)
  - يوسف (٥٢، ٥٧)
  - الفرقان (٨٢، ٣٤)
  - ئيمان (٢٨، ٢٧)
  - طه (٥٧٧، ٣٤)
  - النحل (٤١، ٧٧، ٧٢، ٢٥، ٢١، ٢٢، ٢٢، ٤٧٧، ٢، ٢)
  - النمل (٥٢، ٥٢، ١٢، ٨٢، ٢٧، ١٧، ٢٧)
  - السجده (١٨)
  - الحديد (٢)
  - هود (٢، ٤٥)
  - يونس (١٣، ٧٥)
  - الروم (٢٣، ٢٣، ١٤، ٢٧، ٥٨، ٢٥)
  - فصلت (٢٣، ٢٣)
  - الحج (٧٢، ٤٢، ٨٨، ٣١)
  - الحجر (٢٧، ٨٨)
  - الزبىاء (٧٣، ١٣، ١٥)
  - الزاريات (١٥)
  - الزلزله (٧)
  - القصص (٢١، ٢١، ١٢، ٧٢، ٨٢)
  - النور (١٣، ٨٨، ٨٨، ١٥، ٤٥، ٣٥)
  - الجمعة (٧٧، ٨٢، ١٧، ٧٧، ٤)
  - القمر (١)
  - الواقعة (٢٢)
  - الفطر (١٨، ٣٧)
  - الملك (٢٧)
  - الصف (١٧)
  - الجن (٣٧)
  - الشورى (٢٨)
  - الزخرف (٧٧)
  - النمل (٧)