UNIVERSITY OF SARGODHA
OFFICE OF TIIE REGISTRAR
(ACAD BRANCH)

NOTIFICATION

On the recommendations of Academic Council made in its 21st (2/2024) meeting held on 07.06.2024, the Syndicate in its 67th (3/2024) meeting held on 12.07.2024 approved the following curricula for implementation w.e.f. Fall 2024.

I.	BS in Climate Change.	(Annex-'A')
II.	BS in Farm Management	(Annex-'B')

(WAQAR AHMAD)
Additional Registrar (General)

No. SU/Acad/25/ 120

Dated: 31.01.2025

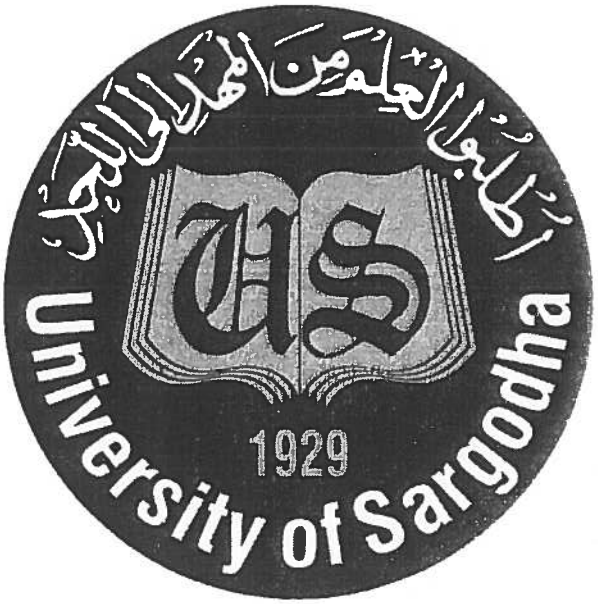
Distribution:

- Chairman, Department of Agronomy
- Controller of Examinations
- Director Academics

C.C:

- Dean, Faculty of Agriculture
- Principal College of Agriculture
- Director, QEC
- Additional Registrar (Affiliation & Registration)
- Secretary to the Vice-Chancellor
- PA to Registrar
- Notification File

Scheme of Studies
for
Bachelor of Science in Farm Management
(BS Farm Management)
2024



Department of Agronomy

College of Agriculture

University of Sargodha, Sargodha

Dr. Muhammad Ather Nadeem
Chairman
Department of Agronomy
College of Agriculture
University of Sargodha Sargodha

Vetted
13-01-25

Curriculum

1. **Title of Degree Program:** Bachelor of Science in Farm Management
2. **Rationale:** The BS Farm Management program prepares students to address challenges in modern agriculture, including resource efficiency, sustainability, and food security. It combines theoretical knowledge with practical skills in farm planning, financial management, and technology use, equipping graduates to enhance productivity and resilience in the agricultural sector.
3. **Department Overview:** The Department of Agronomy is engaged in developing human resource in crop production and tends to integrate knowledge about crop plants and field-oriented work to boost the country's national economy. Established in 2007, our department has highly qualified Ph.D faculty (11) and has a strong track record of providing a comprehensive education at the undergraduate, Master's, and Ph.D. levels. We conduct high-impact applied research in crop production, crop growth modeling, mechanization, weed science, natural resource management, and farm management, addressing immediate problems, future challenges, and climate change impacts. Our leadership in agronomic education through quality teaching, innovative research, and effective outreach practices equips students and professionals with the skills to ensure environmentally safe, health-efficient, and sustainable production mechanisms, ultimately enhancing farm productivity and contributing to the agricultural economy of country.
4. **Description of Degree program:** The BS Farm Management program is an interdisciplinary course that blends agriculture, economics, and business management. It focuses on equipping students with skills in farm planning, resource management, financial analysis, and decision-making. The program emphasizes modern agricultural practices, sustainable resource use, and the application of technology to optimize farm operations. Graduates are prepared to manage farms, agribusinesses, and agricultural projects effectively, ensuring profitability, sustainability, and adaptability in the face of global agricultural challenges.
5. **Program Learning Objectives:** To equip students with essential knowledge and practical skills for effective and sustainable farm management.
6. **Program Structure:**

Duration	**Minimum 4-Years (8-Semesters), Maximum 6-Years (12-Semesters)**
Admission Requirements:	Eligibility: At least 50% marks in SSC & HSSC (Part-I / II) Pre-Medical / Pre-Engineering or Diploma in Agricultural Sciences (Part-II/III) or Equivalent.
Degree Completion Requirements:	Degree Requirements: 120-144 credit hours

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7. General Education (Gen Ed) Requirements: (Mandatory/Core Curses):

The minimum requirement for Gen Ed is 33 credits hours and will be offered in first four semesters only.

Sr. No.	Semester	Course Code	Course Title	Credit Hours	Prerequisite
1.	1	URCG-5118	Functional English	3(3-0)	Nil
2.	1	URCG-5105 URCG-5126	Islamic Studies (Compulsory) OR Religious Education/Ethics (For Non-Muslims)	2(2-0)	Nil
3.	1	URCG-5123	Applications of Information and Communication Technologies (ICT)	3(2-1)	Nil
4.	2	URCG-5112	Fables, Wisdom Literature, and Epic	2(2-0)	Nil
5.	2	URCG-5116	Science of Society-I	2(2-0)	Nil
6.	2	URCG-5120	Exploring Quantitative Skills	3(3-0)	Nil
7.	2	URCG-5127	Seerat of the Holy Prophet (SAW)	1(1-0)	Nil
8.	2	URGC-5128	Pakistan Studies	2(2-0)	Nil
9.	2, 4, 6, 7	URCG-5111	Translation of Holy Quran	NC	Nil
10.	3	URCG-5119	Expository Writing	3(3-0)	Nil
11.	3	URCG-5121	Tools for Quantitative Reasoning	3(3-0)	Nil
12.	3	URCG-5122	Ideology and Constitution of Pakistan	2(2-0)	Nil
13.	4	URCG-5115	The Science of Global Challenges	3(2-1)	Nil
14.	4	URCG-5124	Entrepreneurship	2(2-0)	Nil
15.	4	URCG-5125	Civics and Community Engagement	2(2-0)	Nil
GE Courses Credit Hours Total				**33(31-2)**	

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8. Single Major Courses:

Sr. No.	Course Code	Course Title	Credit Hours	Prerequisite
1.	AGRO-5901	Basic Agriculture	2(1-1)	Nil
2.	SAES-5801	Introduction to Soil Science-I	2(1-1)	Nil
3.	FWRW-6705	Agroforestry	3(2-1)	Nil
4.	AEXT-5401	Introduction to Agricultural Extension and Rural Development	2(2-0)	Nil
5.	ANSC-5111	Introduction to Farm Animal Health	3(2-1)	Nil
6.	AGRO-5904	Field Crop Production	3(2-1)	AGRO-5901
7.	SAES-5802	Introduction to Soil Science-II	2(1-1)	Nil
8.	AEXT-5402	Communication Skills in Agricultural Extension	2(2-0)	Nil
9.	ENTO-5101	Introductory Entomology	2(1-1)	Nil
10.	PLPT-5302	Introductory Plant Pathology	2(1-1)	Nil
11.	AGEC-5501	Principles of Agricultural and Resource Economics	2(2-0)	Nil
12.	HORT-5601	Introductory Horticulture	2(1-1)	Nil
13.	PLBG-5202	Introductory Plant Breeding	2(1-1)	Nil
14.	ENTO-6112	Stored Product Pests and their Management	3(2-1)	ENTO-5101
15.	PLPT-6315	Plant Disease Management	3(2-1)	PLPT-5302
16.	AGEC-5502	Agribusiness Management and Marketing	2(2-0)	Nil
17.	FRMT-6101	Sustainable Agriculture and Organic Farming	3(2-1)	AGRO-5901
18.	FRMT-6102	Production Technologies of Major Vegetables	3(2-1)	HORT-5601
19.	FRMT-6103	Farm Planning and Budgeting	3(3-0)	AGEC-5501
20.	ANSC-6131	Poultry Farm Management	3(2-1)	ANSC-5111
21.	AGRO-6914	Forage and Fodder Production	3(2-1)	AGRO-590
22.	FRMT-6104	Circular Economy for Farm Management	3(3-0)	AGEC-5501
23.	AGRO-6903	Agro-Technology of Major Crops	3(2-1)	AGRO-5904
24.	FMRT-6105	Agricultural Pests and Weeds Management	3(2-1)	
25.	FMRT-6106	Agronomy of Fruit Production	3(2-1)	HORT-5601
26.	AGRO-6917	Principles of Weed Science	3(2-1)	AGRO-5904
27.	ANSC-6116	Management of Dairy Animals	3(2-1)	ANSC-5111
28.	FRMT-6107	Vertical Farming Systems	3(2-1)	
29.	AGRO-6916	Agro Technology of Minor Field Crops and Medicinal Plants	3(2-1)	AGRO-5904
30.	AGRO-6919	Conservation Agronomy	3(2-1)	AGRO-5904
31.	FRMT-6108	Preparation of Research Project and Scientific Writing	2(1-1)	NIL
32.	AGRO-6912	Farming Systems and Farm Records	3(2-1)	AGRO-6913
33.	FRMT-6109	Agrochemicals and Disease Management	3(2-1)	PLPT-5302
34.	FRMT-6110	Harvest and Handling of Crops	3(2-1)	AGRO-5904
35.	ANSC-6134	Feed Evaluation, Formulation and Processing Technology	3 (2-1)	ANSC-5111
Major Courses Credit Hours Total			**93(64-29)**	

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9. Interdisciplinary/Allied courses: minimum 12 credit hours:

1.	ZOOL-6141/ MATH-5128	Introduction to Biology-I (for Pre-Engineering students)/ Mathematics (for Pre-Medical students)	3(3-0)/ 3(3-0)	Nil
2.	FSAT-5101	Introduction to Food Science and Technology	3(2-1)	Nil
3.	STAT-5126	Statistics for Agricultural Sciences	3(3-0)	Nil
4.	FSAT-6114	Fruit and Vegetable Processing	3(2-1)	Nil
Interdisciplinary Courses Credit Hours Total			**12(10-2)**	

10. Field experience/internship: Minimum 03 credit hours:

Lasting 6-8 weeks and ideally scheduled after/during summer breaks after 4th semester.

1.	FRMT-6111	**Field experience / internship**	**3(0-3)**	

11. Capstone project: Minimum 03 credit hours:

This project, after the sixth semester, requires faculty supervision and evaluation following department guidelines

1.	**FRMT-6112**	**Capstone project**	**3(0-3)**	

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SCHEME OF STUDIES

Semester-I

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 (Compulsory)/ OR Religious Education/Ethics (For Non-Muslims)	2(2-0)	Nil
GE-3	URCG-5123	Applications of Information and Communication Technologies (ICT)	3(2-1)	Nil
IDC-1	ZOOL-6141/ MATH-5128	Introduction to Biology-I (for Pre-Engineering students)/ Mathematics (for Pre-Medical students)	3(3-0)/ 3(3-0)	Nil
Major-1	AGRO-5901	Basic Agriculture	2(1-1)	Nil
Major-2	SAES-5801	Introduction to Soil Science-I	2(1-1)	Nil
Major-3	FWRW-6705	Agroforestry	3(2-1)	Nil
Major-4	AEXT-5401	Introduction to Agricultural Extension and Rural Development	2(2-0)	Nil
		Total Credit Hours	**20 (16-4)**	

Semester-II

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-4	URCG-5112	Fables, Wisdom Literature, and Epic	2(2-0)	Nil
GE-5	URCG-5116	Science of Society-I	2(2-0)	Nil
GE-6	URCG-5120	Exploring Quantitative Skills	3(3-0)	Nil
GE-7	URCG-5127	Seerat of the Holy Prophet (SAW)	1(1-0)	Nil
GE-8	URGC-5128	Pakistan Studies	2(2-0)	Nil
GE-9	URCG-5111	Translation of Holy Quran – I	NC	Nil
Major-5	ANSC-5111	Introduction to Farm Animal Health	3(2-1)	Nil
Major-6	AGRO-5904	Field Crop Production	3(2-1)	AGRO-5901
Major-7	SAES-5802	Introduction to Soil Science-II	2(1-1)	Nil
Major-8	AEXT-5402	Communication Skills in Agricultural Extension	2(2-0)	Nil
		Total Credit Hours	**20 (17-3)**	

Semester-III

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-10	URCG-5119	Expository Writing	3(3-0)	Nil
GE-11	URCG-5121	Tools for Quantitative Reasoning	3(3-0)	Nil
GE-12	URCG-5122	Ideology and Constitution of Pakistan	2(2-0)	Nil
IDC-2	FSAT-5101	Introduction to Food Science and Technology	3(2-1)	Nil
Major-9	ENTO-5101	Introductory Entomology	2(1-1)	Nil
Major-10	PLPT-5302	Introductory Plant Pathology	2(1-1)	Nil
Major-11	AGEC-5501	Principles of Agricultural and Resource Economics	2(2-0)	Nil
Major-12	HORT-5601	Introductory Horticulture	2(1-1)	Nil
		Total Credit Hours	**19(15-4)**	

Semester-IV

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
GE-13	URCG-5115	The Science of Global Challenges	3(2-1)	Nil
GE-14	URCG-5124	Entrepreneurship	2(2-0)	Nil
GE-15	URCG-5125	Civics and Community Engagement	2(2-0)	Nil
GE-9	URCG-5111	Translation of Holy Quran – II	NC	Nil
IDC-3	STAT-5126	Statistics for Agricultural Sciences	3(3-0)	Nil
Major-13	PLBG-5202	Introductory Plant Breeding	2(1-1)	Nil
Major-14	ENTO-6112	Stored Product Pests and their Management	3(2-1)	Nil

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Major-15	PLPT-6315	Plant Disease Management	3(2-1)	PLPT-5302
Major-16	AGEC-5502	Agribusiness Management and Marketing	2(2-0)	Nil
		Total Credit Hours	**20(16-4)**	

SEMESTER-V

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Major-17	FRMT-6101	Sustainable Agriculture and Organic Farming	3(2-1)	AGRO-5901
Major-18	FRMT-6102	Production Technologies of Major Vegetables	3(2-1)	HORT-5601
IDC-4	FSAT-6114	Fruit and Vegetable Processing	3(2-1)	HORT-5601
Major-19	FRMT-6103	Farm Planning and Budgeting	3(3-0)	AGEC-5501
Major-20	ANSC-6131	Poultry Farm Management	3(2-1)	ANSC-5111
Major-21	AGRO-6914	Forage and Fodder Production	3(2-1)	AGRO-5901
Major-22	FRMT-6104	Circular Economy for Farm Management	3(3-0)	AGEC-5501
		Total Credit Hours	**21(16-5)**	

SEMESTER-VI

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Major-23	AGRO-6903	Agro-Technology of Major Crops	3(2-1)	AGRO-5904
Major-24	FMRT-6105	Agricultural Pests and Weeds Management	3(2-1)	ENTO-5101
Major-25	FMRT-6106	Agronomy of Fruit Production	3(2-1)	HORT-5601
Major-26	AGRO-6917	Principles of Weed Science	3(2-1)	AGRO-5904
Major-27	ANSC-6116	Management of Dairy Animals	3(2-1)	ANSC-5111
Major-28	FMRT-6107	Vertical Farming Systems	3(2-1)	ANSC-5101
GE-9	URCG-5111	Translation of Holy Quran – III	NC	Nil
		Total Credit Hours	**18(12-6)**	

SEMESTER-VII

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Major-29	AGRO-6916	Agro Technology of Minor Field Crops and Medicinal Plants	3(2-1)	AGRO-5904
Major-30	AGRO-6919	Conservation Agronomy	3(2-1)	AGRO-5904
Major-31	FRMT-6108	Preparation of Research Project and Scientific Writing	2(1-1)	NIL
Major-32	AGRO-6912	Farming Systems and Farm Records	3(2-1)	AGRO-6913
Major-33	FRMT-6109	Agrochemicals and Disease Management	3(2-1)	PLPT-5302
Major-34	FRMT-6110	Harvest and Handling of Crops	3(2-1)	AGRO-5904
Major-35	ANSC-6134	Feed Evaluation, Formulation and Processing Technology	3(2-1)	ANSC-5111
GE-9	URCG-5111	Translation of Holy Quran – IV	NC	Nil
		Total Credit Hours	**20(13-7)**	

SEMESTER-VIII

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Compulsory-1	FRMT-6111	Research Project / Internship	3(0-3)	NIL
Compulsory-2	FRMT-6112	Capstone Project	3(0-3)	NIL
		Total Credit Hours	**06(0-6)**	

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SEMESTER-I

URCG-5118 **Functional English** **3(3-0)**

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.

Suggested 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

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URCG-5105 Islamic Studies (Compulsory) 2(2-0)

Introductory/compulsory foundation course

Islamic Studies engages in the study of Islam as a textual tradition inscribed in the fundamental sources of Islam; Qur'aan 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 basis of Islam in fields that include Qur'aanic studies, Hadith and Seerah of Prophet Muhammad (PBUH), Islamic philosophy, and Islamic law, culture and theology through the textual study of Qur'aan and Sunnah.

- To make students understand the relevance and pragmatic significance of Islam in theirlives.
- To make learners comprehend the true spirit of Islam with reference to modernworld.
- To generate a sense of Islamic principles as a code of living that guarantee the effective solutions to the current challenges ofbeing.
- To provide Basic information about IslamicStudies
- To enhance understanding of the students regarding IslamicCivilization
- To improve Students skill to perform prayers and otherworships
- To enhance the skill of the students for understanding the issues related to faith and religious life.

Contents

1.Introduction to Qur'aanic Studies تعارف قرآن مجید

1) Basic Concepts of Qur'aan قرآن مجید کا بنیادی تعارف

2) History of the compilation of Qur'aa تاریخ جمع وتدوین قرآن مجید

3) Uloom-ul-Qur'aan علوم القرآن

مطالعہ قرآن (تعارف قرآن مجید، منتخب آیات کا ترجمہ و تفسیر: سورۃ البقرہ آیات 1-5، 284-286؛ سورۃ الحجرات آیات 1-18؛ سورۃ الفرقان آیات 63-77؛ سورۃ المومنون آیات 1-11؛ سورۃ الاحزاب آیات 6، 21، 32- 33، 40، 56- 59؛ سورۃ الانعام آیات 151-153؛ سورۃ الصف آیات 1- 14؛ الحشر آیات 18- 20؛ آل عمران آیات 190- 192؛ النحل آیات 12-14؛ لقمن آیت 20، حم السجدہ آیت 53

2. Introduction to Hadith تعارف حدیث

1) Legal Status of Hadith حدیث کی قانونی حیثیت

2) History of the compilation of Hadith تاریخ جمع وتدوین حدیث

3) Classifications of Hadith حدیث کی اقسام

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

1۔ اعمال کا اجر نیت پر منحصر ہے۔ 2۔ بہترین انسان قرآن کا طالب علم اور اس کا معلم ہے۔ 3۔ کتاب و سنت گمراہی سے بچنے کا ذریعہ ہیں 4۔ ارکان اسلام 5۔ اسلام، ایمان، احسان اور قیامت کی نشانیاں، 6۔ بچوں کو نماز کی تلقین 7۔ دین کا گہرا فہم اللہ کی خاص عنایت ہے 8۔ حصول علم، تلاوتِ قرآن اور عمل کی اہمیت و فضیلت، 9۔ روز محشر میں ہونے والا محاسبہ، 10۔ حقوق اللہ کے ساتھ ساتھ حقوق العباد کا لحاظ رکھنا بھی لازم ہے 11۔ حسن خلق کی عظمت اور فحش و بدگوئی کی مذمت 12۔ دنیا و آخرت کی بھلائی کی ضامن چار چیزیں، 13۔ ہلاک کر دینے والی سات چیزیں، 14۔ بے عمل مبلغ کا عبرت ناک انجام 15۔ ہر شخص نگران ہے اور ہر شخص مسئول

3. Sirah of the Prophet (PBUH)	سیرت النبی ﷺ
1. Significance of Seerah Studies	مطالعہ سیرت کی ضرورت و اہمیت
2. Prophetic principles of Character building	تعمیر سیرت و شخصیت کا نبوی منہاج

اقامت دین کا نبوی طریق کار، اقامتِ دین بعہدِ خلافت راشدہ، میثاق مدینہ، خطبہ حجۃ الوداع، اخلاقی تعلیمات، تشکیل اجتماعیت اور اسوہ حسنہ، قرآن مجید میں سیرت سرور عالم کا بیان، غزواتِ نبوی ﷺ کے مقاصد و حکمتیں

4. Islamic Culture & Civilization	اسلامی تہذیب و تمدن
1) Basic Concepts of Islamic Civilization	اسلامی تہذیب کا مفہوم
2) Historical evaluation of Islamic Civilization	اسلامی تہذیب کا تاریخی ارتقاء
3) Salient feature of Islamic Civilization	اسلامی تہذیب کی نمایاں خصوصیات
4) Islamic Civilization and ContemporaryIssues	اسلامی تہذیب و تمدن اور معاصر مسائل

اسلامی تہذیب کے عوامل و عناصر، اسلامی تہذیب کے علمی، معاشرتی اور سماجی اثرات، تہذیبوں کے تصادم کے نظریے کا تنقیدی 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 ullahMuhammad, —Emergence ofIslam ,IRI,Islamabad
2) Hameed ullah Muhammad, —Muslim Conduct ofState
3) Hameed ullah Muhammad, _Introduction tolslam
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. Muhammad Shahbaz Manj, Teleeemat-e- Islam

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Chairman

URCG-5126 **ETHICS** **2(2-0)**

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

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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 systemscan 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

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

Suggested Books

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

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ZOOL-6141 **Introduction to Biology-I** **3 (3-0)**

This subject aims to yield students with a sense of practical relevance of biology to everyday life. This will make students comprehend life by understanding some of the molecular processes that occur in and around cells, to make students cognizant of biologic phenomenon (nature, body, etc.) on an evolutionary, ecological, behavioral, physiologic, tissue, cellular, and molecular level. In this subject students will examine how life is organized into hierarchical levels; how living organisms use and produce energy; how life grows, develops, and reproduces; how life responds to the environment to maintain internal stability; and how life evolves and adapts to the environment. Moreover, it will also enable them to investigate the biological molecules, homeostasis in vertebrates, and the influence of hormones on coordination and control systems of animal body. Upon completion of this subject students will be having an enhanced knowledge and appreciation of the basics of growth and development plans of animals and can develop cogent and critical arguments based on the course material.

Contents

1. Introduction: Nature and scope of biology, Branches of biology, Relationship between biology and psychology
2. Biological molecules: Carbohydrates, Proteins, Fats, Nucleic acids,Water
3. The cell: Structure and function of cell, Cell organelles, Different types of cells
4. Homeostasis: Osmoregulation, Structure and functions of Nephron, Thermoregulation
5. Coordination and control: Structure and physiology of Neuron, Introduction to central and peripheral nervous system, Hormones
6. Basics of growth and development: Embryonic and post embryonic development

Recommended Texts

1. Michael, J. and Lenardo. (2013). *Immune Homeoststis: Methods and protocol.* Humama press.
2. Campbell, M. and Christopher J. P. (2016). *Organismal homeostatis.* Momentum press.

Suggested Readings

1. Lisa A. U., Michael L. C., Steven A. W., Peter V. M., Jane B. R. and Neil A. C. (2016). Campbell *biology.* 11th Pearson
2. Cambell, N. A. Mitchell, l. G. and Reece, J. B. (2009). *Biology: Concepts and connections.* 6th edition San Francisco: Addison Wesley, Longman
3. Anna A. S., Richard B. P. (2019). An Introduction to Conservation Biology 2nd Edition. Sinauer Associates is an imprint of Oxford University Press

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MATH-5128 **Mathematics** **3(3-0)**

To prepare the students, not majoring in mathematics, with the essential tools of algebra to apply the concepts and the techniques in their respective disciplines. Mathematics, as a study of patterns, both practical and abstract, involves analytical thought, logical reasoning, problem solving skills, and precise communication. Because of its power and versatility, mathematics has often been called the "Queen of the Sciences." There is no field of scientific inquiry that does not express itself through the language of mathematics. An undergraduate degree in mathematics provides an excellent foundation for students who are interested in pursuing an advanced degree in mathematics or in a related specialized profession. Mathematics can also provide an excellent foundation for students considering professional degrees in such allied fields such as Law, Business Administration, or Medicine. The kinds of analytical and logical thinking skills that one develops while studying mathematics are precisely the skills that recruiters look for in potential employees. Jobs involving significant mathematical background also consistently rank near the top of the list in annual career surveys.

Contents

1. Real Numbers
2. Relations and Functions
3. Inequalities
4. Quadratic Functions and Complex Numbers
5. Linear Equations and Quadratic Equations: Formation of Linear equation
6. Solving Linear equation involving one variable
7. Solution of Quadratic equation by factorization method
8. Solution of quadratic equation by square completion methods
9. Solution of quadratic equation by quadratic formula
10. Application of quadratic equation
11. Sequence and Series
12. Types of Sequences; A. P, A. M., G. P., H. P
13. Trigonometric Functions, Trigonometric Applications
14. Graph of Functions and Modelling
15. Limits and Continuity
16. Derivatives, Integration
17. Probability and Binomial Theorem.

Recommended Texts

1. Gantert, A. X. (2009). *Algebra 2 and trigonometry*. New York: AMCOS School Publication INC.
2. Kaufmann, J. E. (1994). *College algebra and trigonometry* (3th ed.). Boston: PWS-Kent Pub. Co.

Suggested Readings

1. Swokowski, E. W. (1993). *Fundamentals of algebra and trigonometry* (8th ed.). Boston: PWS-Kent Pub. Co.
2. Nauman, K. (2019). Basic mathematics-I: algebra and trigonometry (2nd ed.). Lahore: Al-Hassan Pub.
3. Anton, H. (1999). *Calculus: A new horizon* (6th ed.). New York: John Wiley.
4. Stewart, J. (2012). *Calculus* (7th ed.). Belmont: Brooks/Cole.

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AGRO-5901 **Basic Agriculture** **2(1-1)**

The main aim of this course is to provide the basic knowledge and background about Pakistan's Agriculture. Basic Agriculture is a graduate-level course which gives the students a basic knowledge of agriculture/ It will enable the students to understand the basic terminologies of agriculture, its different branches, allied disciplines, salient features of Pakistan's agriculture including climate, land resources etc. as well as the problems of Pakistan agriculture. Basic knowledge about agricultural inputs such as seed, fertilizer, irrigation etc. will be communicated. Crop growth related problems like weeds, insect pests will be elaborated. The students will be able to understand the conventional and international system of land measurement. The knowledge of post-harvest technology is also shared with the students.

Contents

Theory

1. Agriculture, history, importance, branches and allied sciences.
2. Salient features of Pakistan's agriculture.
3. Climate, land and water resources.
4. Tillage: objectives and types.
5. Seed: types and quality.
6. Crop nutrients, manures and fertilizers, sources and methods of application.
7. Irrigation: systems, types and management.
8. Harvesting, processing, storage and marketing of farm produce.

Practical

1. Land measuring units.
2. Demonstration of hand tools and tillage implements.
3. Identification of meteorological instruments.
4. Identification of crop plants, weeds and seeds.
5. Identification of organic and inorganic fertilizers.
6. Calculation of nutrient-cum-fertilizer unit value.
7. Demonstration of various irrigation methods.
8. Field visits.

Recommended Texts

1. Bashir, E. and Bantel, R.. (2001), *Soil Science*, Islamabad, National Book Foundation.
2. Brady, N.C. and Weil, R.R. (2013). *Elements of the Nature and Properties of Soils,* 3rd Ed. Upper Saddle River, NJ, USA, Pearson Education.

Suggested Readings

1. Hillel, D. (2008). *Soil in the Environment: Crucible of Terrestrial Life.* Burlington, MA, USA, Elsevier Inc.
2. Safdar, M.E., Javaid, M.M., Tanveer, A., Ali, H.H. and Kamran, M. (2019). Innovation in Agronomic Concepts. Higher Education Commission, Islamabad.
3. Das, D.K. (2011). *Introductory Soil Science* (3rd ed.). New Delhi-110002, India, Kalyani Publ.

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SAES-5801 **Introduction to Soil Science-I** **2(1-1)**

This is an introductory course designed to introduce the concept and significance of soil science for agriculture students at undergraduate level. It provides information to the students about soil science and its branches as well as their environmental significance. This course also delivers knowledge to the students about weathering of rocks and minerals as well as their classification. This course gives information to the students about physical properties of soil and their significance in agriculture. This subject also improves the awareness of the students about impact of agricultural and industrial wastes on our environment. In addition, this course also improves the skills of the students how to collect soil and water samples for physico-chemical analysis. Laboratory exercise will be designed to develop student competency for analysis of irrigation water and soil samples. Ability to highlight and support the importance of both water and soil quality analysis for judicious-use of resources.

CONTENTS

Theory

1. Introduction to Soil and environment: definition of earth, geology and soil science; disciplines of soil science; lithosphere, hydrosphere and biosphere
2. Weathering of rocks and minerals: definition. Agents and classification
3. Parent materials: definition and types
4. Soil formation: definitions, processes and factors
5. Soil profile: definition and description
6. Soil, water and air pollution: sources and types

Practical

1. Methods of soil sampling and handling
2. Preparation of saturated soil paste
3. Determination of soil water contents
4. Analysis of irrigation water, report writing and interpretation.
5. Textural analysis of soil

Recommended Texts

1. Bashir, E. & R. Bantel. (2001). *Soil Science*. Islamabad, National Book Foundation.
2. Brady, N.C. & R.R. Weil. (2007). *The Nature and Properties of Soils* (14th ed.). Upper Saddle River, NJ, USA, Pearson Education.

Suggested Readings

1. Brady, N.C. & R.R. Weil. (2009). *Elements of the Nature and Properties of Soils* (3rd Ed.). Upper Saddle River, NJ, USA, Pearson Education.
2. Hillel, D. (2008). *Soil in the Environment:* Burlington, MA, USA. Crucible of Terrestrial Life. Elsevier Inc.
3. Das, D.K. (2011). *Introductory Soil Science* (3rd ed.). New Delhi-110002, India.

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FWRW-6705 **Agroforestry** **3(2-1)**

This course is designed to give the basic knowledge of agroforestry and agroforestry systems being practiced in Pakistan. Agroforestry is a land use and its management system in which trees or shrubs are grown around or among crops or pastures depending on the suitability of the site, locality factors and environmental conditions. This intentional combination of agriculture / pastures and forestry has a variety of benefits, including increased biodiversity and productivity and reduced erosion and other environmental hazards. This course is especially important in Pakistan's perspective where forest resources are meager and meeting demands for wood and wood products is a big challenge. After the completion of this course students will be able to select the suitable tree species to be grown on the farmlands of irrigated and rain-fed areas of the country and to overcome the problems of agroforestry in a scientific way. Students will also be able to provide the basic guideline to the farmers to maximize their income by judicious combination of different components under limited resources in hand.

CONTENTS

Theory

1 Definition of a system, farming system and agroforestry system
2 Importance, need, objectives and potential of Agroforestry systems
3 Agroforestry Systems and classification by Major components (agrisilvicultural, silvipastoral, agrosilvopastoral and other systems),
4 Temporal and spatial character, function and application, and spread and management
5 Current agroforestry systems in Pakistan in view of establishment, cultural and harvest techniques i.e., Rotation Systems, Permanent Tree and Field Crop Systems, Tree-pasture Systems and Minor Forest Products systems, Tree and Aquatic, Tree and Forage, miscellaneous forest products such as medicinal plants, Kitchen Gardens (Home Gardens)
6 Agroforestry Systems in Latin American, African and Asian Countries
7 Designing Agroforestry Systems (Land capability classifications and their application to design of agroforestry)

Practical

1 Visits to various Agroforestry Systems in Pakistan
2 Practice to design an Agroforestry system

Recommended Texts

1. Dwivedi, A. P. (1992). *Agroforestry, principles and practices*. New Delhi: Oxford and IBH Publishing Company.
2. Jha, L. K. (2009). *Advances in agroforestry*. New Delhi: APH Publishing Corporation.

Suggested Readings

1. Jose, S., & Gordon, A. M. (Eds.). (2008). *Toward agroforestry design: an ecological approach* (Vol. 4). Springer Science & Business Media.
2. Vergara, N.T. and MacDicken, K. G. (1990). *Agroforestry: classification and management*. New York: John Willey and Sons.

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AEXT-5401 Introduction to Agricultural Extension and Rural Development 2(2-0)

The main purpose of this course is to give brief introduction of Agricultural Extension education at undergraduate level. The students must know the history and philosophy of agricultural education in the development of present era agricultural system across the world. The following such as concepts of Extension education and rural development, principles of effective extension work, concepts of program planning, research, program evaluation and their importance in agricultural extension and rural development work, Role of communication and ICTs in extension work and development activities in rural areas for the growth of the masses are important to disseminate among undergraduate students so that students will prepare themselves to learn more advance ideas in agricultural education and research. The students will be able to perform better in dissemination of different agricultural technologies.

Contents

1. Agricultural extension; its definition, objectives and importance,
2. Types of education, Brief history/recent trends in agricultural extension,
3. Rural development, its definition/concept, objectives, importance and indicators,
4. Current issues and problems of rural development and extension work in Pakistan. Roles and duties of extension workers at various organizational levels,
5. Extension programs and activities since 1947 to date in Pakistan, role of communication and ICT in Extension and Rural Development work,
6. Principles of effective extension work. Adoption and diffusion of agricultural innovations, Agricultural Technology and its application for Pakistani farmers,

Recommended Texts

1. Ray, G.L. (2006). *Extension Communication and Management*; Kalyani Publishers.
2. Ison, R. & Russell, D. (2004). *Agricultural Extension and Rural Development: Breaking out of Knowledge Transfer Traditions;* Cambridge University Press.

Suggested Readings

1. Bashir, E. (2005). *Extension Methods* (2nd ed.). Islamabad, National Book Foundation.
2. Narasaiah, M.L. (2003). *Approaches to Rural Development.* New Delhi (India), Discovery Publishing House.
3. Leeuwis, C. & Van den Ban, A. (2004). *Communication for rural Innovation: Rethinking Agricultural Extension* (3rd ed.). Wiley-Blackwell.

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SEMESTER-II

URCG-5112 **Fables, Wisdom Literature, and Epic** **2(2-0)**

The course will enable students to explore human experiences, cultivate an appreciation of the past, enrich their capacity to participate in the life of their times, and enable an engagement with other cultures and civilizations, both ancient and modern. But independently of any specific application, the study of these subjects teaches understanding and delight in the highest achievements of humanity. The three components of the course, including fables, wisdom literature and epic, will enable the learners to explore and understand the classic tradition in literature. Development of personal virtue, a deep Sufi ethic and an unwavering concern for the permanent over the fleeting and the ephemeral are some of the key themes explored in the contents that will develop an intimate connection between literature and life.

Contents

1. Fables
   The Fables of Bidpai
   The Lion and the Bull
   The Ring-dove
   The Owls and the Crows

   Selected poem from Bang-i-Dara

2. Gulistan-e- Sa'di
   Ten ḥikāyāt from John T. Platts, *The Gulistan*
3. Epic
   THE SHĀHNĀMA OF FIRDAUSI

Recommended Texts

1. John T. P. (1876). *The Gulistan; or, Rose Garden of Shaikh Muslihu'd- Dīn Sa'dī of Shīrāz*. London: Wm. H. Allen.
2. Chishti, Y.S. (1991). *Sharaḥ-i bāng-i darā*. Lāhaur: Maktaba-i ta'mīr-i insāniyat

Suggested Readings

1. Thackston, W. (2000). A Millennium of Classical Persian Poetry. Maryland: Ibex Publishers.
2. Wood, R. (2013). Kalila and Dimna: Fables of Conflict and Intrigue. United Kingdom: Medina Publishing, Limited.

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URCG-5116 **Science of Society-I** **2 (2-0)**

This course will introduce students with the subject matter of social science, its scope,nature and ways of looking at social phenomenon. It will make the participants acquaintance with thefoundations of 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 sociology, politics, economics anthropology and psychology andmake them 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 andnon-western contexts. Instruction will include the use of written texts, audio-visual aids and field visits.

Learning Outcomes:

The course has following outcomes:

It will

- Introduce student with the nature of human social behavior and foundations of human group life
- Analyze the reciprocal relationship between individuals and society.
- Make student aware with the nature of societies existing in modern world
- Make students familiar with the philosophy of knowledge of social sciences
- Introduce students with the works of prominent theories explain human group behavior
- Help students to understand the foundations of society including culture, socialization, politics and economy
- Introduce students with various dimensions of social inequalities with reference to gender, race, ethnicity and religion
- Make them aware about the understanding of various themes pertains to social science in local context
- Help them recognize the difference between objective identification of empirical facts,and subjective formulation of opinionated arguments

Course Outlines:

1. **Introduction to Social Sciences**
   - Social world, Human Social behavior, Foundations of society
   - Evolution of Social sciences
   - Philosophy of Science
   - Scope and nature of social sciences
   - Modernity and social sciences
   - Branches of social science: Sociology, Anthropology, Political Science, Economics

Society and Community, Historical evolution of Society

- Types of Societies
- Foraging society, Horticultural society, Pastoralist society
- Agrarian societies, Industrial society, Postindustrial society

2. **Philosophy of Knowledge in social Science and social inquiry**
   - Understanding social phenomenon
   - Alternative ways of knowing
   - Science as a source to explore social reality
   - Objectivity, Value-Free research
   - Positivism vs Interpretivism
   - Qualitative vs Quantitative

3. **Culture and Society**
   - Idea of Culture, Assumptions of Culture

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- Types, Components, Civilization and culture
- Individual and culture. Cultural Ethnocentrism, Cultural Relativism
- Outlook of Pakistani culture
- Global Flows of culture, Homogeneity, Heterogeneity

4. **Social Stratification and Social inequality**
   - Dimensions of inequality, Social class
   - Gender, Race, Religion, Ethnicity, Caste
   - Patterns of social stratification in Pakistan
   - Class, caste system in agrarian society
   - Ascription vs Achievement, Meritocracy
   - Global stratification in modern world, Global patterns of inequality
5. **Personality, Self and Socialization**
   - Concept of self, Personality
   - Nature vs Nurture, Biological vs Social
   - Development of Personality
   - Socialization as a process, Agents of socialization
   - Socialization and self/group identity
6. **Gender and Power**
   - Understanding Gender
   - Social construction of Patriarchy
   - Feminism in Historical context, Gender Debates
   - Gender and Development
   - Gender issues in Pakistani society, Women Participation in politics, economy andeducation
   - Toward a gender sensitive society, Gender mainstreaming

Pakistan: State, Society, Economy and Polity

- Colonialism, colonial legacy, National identity
- Transformation in Pakistani society: Traditionalism vs Modernism
- Economy, Informality of Economy, Modern economy and Pakistan
- Political Economy, Sociology of Economy

Recommended Textbooks and Reading Materials:

1. Giddens, A. (2018). Sociology (11th ed.). UK: Polity Press.
2. Henslin, J. M. (2018). Essentials of Sociology: A Down-to-Earth Approach.(18th Edition) Pearson Publisher.
3. Macionis, J. J. (2016). Sociology (16th ed.). New Jersey: Prentice-Hall.
4. Qadeer, M. (2006) Pakistan - Social and Cultural Transformation in a Muslim Nation.
5. Smelser, N.J. and Swedburg, R., The Handbook of Economic Sociology, Chapter 1 'Introducing Economic Sociology', Princeton University Press, Princeton.
6. Systems of Stratification | Boundless Sociology (no date). Available at: https://courses.lumenlearning.com/boundless-sociology/chapter/systems-of-stratification/
7. Jalal, A. (ed.) (1995) 'The colonial legacy in India and Pakistan', in Democracy and Authoritarianism in South Asia: A Comparative and Historical Perspective. Cambridge: Cambridge University Press (Contemporary South Asia)
8. Zaidi, S. A. (2015) Issues in Pakistan's Economy: A Political Economy Perspective. Oxford University Press. Chapter 26
9. Akhtar, A. S. (2017) The Politics of Common Sense: State, Society and Culture in Pakistan. Cambridge: Cambridge University Press.
10. Smelser, N.J. and Swedburg, R., The Handbook of Economic Sociology, Chapter 1 'Introducing Economic Sociology', Princeton University Press, Princeton.

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General Education Cluster: Quantitative Reasoning

URCG-5120 **Exploring Quantitative Skills** **3(3-0)**

This is an introductory-level undergraduate course that focuses on the fundamentals related to the quantitative concepts and analysis. The course is designed to familiarize students with the basic concepts of mathematics and statistics and to develop students' abilities 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 expanding their academic horizon and breadth of knowledge of their specific major / field of study.

Course Learning Outcomes

By the end of this course, students shall have:

1. Fundamental numerical literacy to enable them work with numbers, understand their meaning and present data accurately;
2. Understanding of fundamental mathematical and statistical concepts;
3. Basic ability to interpret data presented in various formats including but not limited to tables, graphs, charts, and equations etc.

Contents

1. Numerical Literacy:
    i. Numbers system and basic arithmetic operations;
    ii. Units and their conversions, dimensions, area, perimeter and volume;
    iii. Rates, ratios, proportions and percentages;
    iv. Types and sources of data;
    v. Measurement scales;
    vi. Tabular and graphical presentation of data;
    vii. Quantitative reasoning exercises using number knowledge.

2. Fundamental mathematical concepts:
    i. Basics of geometry (lines, angles, circles, polygons etc.);
    ii. Sets and their operations;
    iii. Relations, functions, and their graphs;
    iv. Exponents, factoring and simplifying algebraic expressions;
    v. Algebraic and graphical solutions of linear and quadratic equations and inequalities;
    vi. Quantitative reasoning exercises using fundamental mathematical concepts.

3. Fundamental Statistical Concepts:
    i. Population and sample;
    ii. Measures of central tendency, dispersion and data interpretation;
    iii. Rules of counting (multiplicative, permutation and combination);
    iv. Basic probability theory;
    v. Introduction to random variables and their probability distributions;
    vi. Quantitative reasoning exercises using fundamental statistical concepts.

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Recommended Texts

1. Sevilla, A., & Somers, K. (2012). *Quantitative reasoning: tools for today's informed citizen.* New Jersey, John Wiley & Sons.
2. Burzynski, D., & Ellis, W. (2008). *Fundamentals of mathematics.* USA, Saunders College Publishing.

Suggested Readings

1. Zaslow, E. (2020). *Quantitative reasoning: thinking in numbers.* Cambridge, Cambridge University Press.
2. de Mesquita, E. B., & Fowler, A. (2021). *Thinking clearly with data: A guide to quantitative reasoning and analysis.* New Jersey, Princeton University Press.
3. Bennett, J., & Briggs, W. (2019). *Using & understanding mathematics: a quantitative reasoning approach.* Pearson.
4. Rosen, K. H., & Krithivasan, K. (2012). *Discrete mathematics and its applications* (Vol. 6). New York: McGraw-Hill.
5. Chatfield, C. (2018). *Statistics for technology: a course in applied statistics.* Routledge.
6. Lock, R. H., Lock, P. F., Morgan, K. L., Lock, E. F., & Lock, D. F. (2020). *Statistics: Unlocking the power of data.* New Jersey, John Wiley & Sons.

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URCG-5127 **Seerat of the Holy Prophet** مطالعہ سیرت النبی صلی اللہ علیہ وسلم 1(1-0)

Title	Description
Semester	
Nature of Course	
Total Teaching weeks	18
Objectives of the Course	۱۔طلباء کو مطالعہ سیرۃ طیبہ کی ضرورت و اہمیت سے آگاہ کرنا ۲۔ تعمیر شخصیت میں مطالعہ سیرۃ طیبہ کے کردار کو واضح کرنا ۳۔بعثت نبوی کے موقع پر اقوام عالم کی عمومی صورت حال سے آگاہ کرنا ۴۔رسول اکرم صلی اللہ علیہ وسلم کی مکی اور مدنی زندگی کا اس طرح مطالعہ کروانا کہ طلباء ان واقعات سے نتائج کا استنباط کر سکیں ۵۔ طلباء کو عہد نبوی کی معاشرت ، سیاست ، معیشت سے آگاہ کرنا

Course Description

S.No.	Title	Description
1	حضور صلی اللہ علیہ وسلم کے ابتدائی حالات زندگی	۱۔ حضور صلی اللہ علیہ وسلم کا خاندانی حسب و نسب ۲۔ پیدائش اور ابتدائی تربیت ۳۔ لڑکپن اور جوانی کے حالات زندگی
2	بعثت نبوی کے وقت دنیا کے حالات(۱)	۱۔ بعثت نبوی کے وقت اہم تہذیبیں ۲۔ عرب، مصر، حبشہ، بازنطینی، ساسانی
3	بعثت نبوی	۱۔ مکی عہد میں دعوت اسلام
4	بعثت نبوی	۱۔ مدنی عہد میں دعوت اسلام
5	خصائص النبیؐ	آپؐ بطور پیغامبر امن
6	خصائص النبیؐ	بحثیت استاد و معلم
7	خصائص النبیؐ	بحثیت تاجر
8	خصائص النبیؐ	بحثیت سربراہ ریاست
9	خصائص النبیؐ	ذاتی محاسن اور عالمگیر اثرات
10	خصائص النبیؐ	ناموس رسالتؐ
11	اسوہ حسنہ اور عصر حاضر	غیر مسلموں سے تعلقات
12	اسوہ حسنہ اور عصر حاضر	اسوہ حسنہ کی روشنی میں گھریلو زندگی
13	اسوہ حسنہ اور عصر حاضر	مستشرقین اور مطالعہ سیرت
15	اسوہ حسنہ اور عصر حاضر	وطن سے محبت اور سیرت
16	اسوہ حسنہ اور عصر حاضر	مستشرقین کے اعتراضات اور ان کے جوابات

نصابی کتب

نمبر شمار	نام مؤلف	نام کتاب
1	ابن ہشام	السیرۃ النبویۃ
2	مولاناشبلی نعمانی ، سید سلمان ندوی	سیرۃ النبی صلی اللہ علیہ وسلم
3	قاضی محمد سلیمان سلمان منصور پوری	رحمۃ اللعالمین
4	مولانا سیدابو الحسن علی ندوی	نبی رحمت صلی اللہ علیہ وسلم
5	ڈاکٹر یسین مظہر صدیقی	عہد نبوی کا نظام حکومت
6	ڈاکٹر خالد علوی	انسان کامل

حوالہ جاتی کتب

نمبر شمار	نام مؤلف	نام کتاب
1	سید ابوالاعلیٰ مودودی	سیرت سرور عالم صلی اللہ علیہ وسلم
2	مولانا صفی الرحمن مبارکپوری	الرحیق المختوم
3	پیر محمد کرم شاہ الازہری	ضیاء النبی صلی اللہ علیہ وسلم
4	ڈاکٹر اکرم الضیاء العمری	السیرۃ النبویۃ الصحیحۃ
5	مولاناعبدالرؤف دانا پوری	اصح السیر

URCG-5128 Pakistan Studies 2(2-0)

Course Description

This course is designed to provide students with a comprehensive exploration of Pakistan's identity, spanning geographical, historical and cultural dimensions. It delves into the diverse landscape, ancient civilizations, and rich cultural heritage that define Pakistan. Moreover, it examines the socio-cultural and political transformations in Pakistan over time including democratic transitions and military interventions. The aim of this course is to inculcate in students a nuanced understanding of Pakistan's past, present, and potential future trajectories, enabling them to critically evaluate the complex dynamics shaping the nation's development.

Course Learning Outcomes

By the end of this course, student will be able to:

1. Have enhanced knowledge of the geographical, historical and political aspects of Pakistan.
2. Understand the society and cultural of Pakistan.
3. Understand and explain the scio-economics developments in Pakistan.
4. Explore contemporary issues and challenges faced by Pakistan and their implications for the future.

Contents

1. **Introduction to Pakistan:**
   - Geographical location and significance.
   - Historical background: Ancient civilizations in the region.
   - Factors leading to the creation of Pakistan
2. **Political History of Pakistan:**
   - Formative phase
   - Military interventions and democratic transitions.
3. **Geography of Pakistan:**
   - Physiography: Mountains, plains, plateaus, deserts, valleys and coastal areas.
   - River system: Indus river and its tributaries;
   - Climatic regions of Pakistan.
4. **Society and Culture of Pakistan:**
   - Socio- cultural diversity.
   - Language and literature of Pakistan.
5. **Economics Development of Pakistan:**
   - Agriculture and industrial sectors of Pakistan.
   - Economic challenges of Pakistan.
6. **Contemporary Issues:**
   - Foreign relations of Pakistan.
   - Security challenges: terrorism, extremism, regional conflicts.
   - Environmental problems and sustainable development (SDGs).
   - Media and social change.

SUGGESTED READING MATERIALS

1. "Jinnah of Pakistan" by Stanley Wolpert
2. "The sole Spokesman: Jinnah, the Muslim League, and the Demand for Pakistan" by Ayesha Jalal
3. "The struggle for Pakistan" by Ishtiaq Hussain Qureshi
4. "Pakistan, the Formative Phase, 1857-1948" by Khalid B. Sayeed
5. "Pakistan Studies: A Book of Readings" by Sikandar Hayat

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6. "Constitutional and Political History of Pakistan" by Hamid Khan
7. "Trek to Pakistan" by Ahmad Saeed and Kh. Mansur Sarwar
8. "Pakistan: A Modern History" by Ian Talbot
9. "Politics in Pakistan: The Nature and Direction of Change" by Khalid B. Sayeed
10. "Physical Geography of Pakistan" by Umar Jahangir
11. "A Geography of Pakistan: Environment, people, and Economy" by Fazle Karim Khan
12. "Pakistan's Foreign Policy: An Historical Analysis" by S.M. Burke
13. "Separatism in East Pakistan" by Rizwan Ullah Kokab
14. "Being Pakistani: Society, Culture and the Arts" by Raza Rumi
15. "Pakistani's Culture Heritage: Socio-Economic and Technological Aspects" edited by Abdul Jabbar Khan
16. "Language and Politics in Pakistan" by Tariq Rahman
17. Sociology" by Horton and Hunt
18. "Pakistan in the Twentieth Century: A Political History" by Lawrence Ziring
19. "Economic Development of Pakistan" by Ishrat Husain
20. "Issues in Pakistan's Economy" by S. Zaidi

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URCG-5111 **Translation of the Holy Quran - I** **Non-Credit**

Topic	Details
Semester/Level	In some discipline 1st semester and in some discipline 2nd Semester/ ADP Program 1st Year
Objectives	• To familiarize the students to keys and fundamentals of recitation of the holy Quran. • To develop the skill of the students of recitation the last revelation. • Students will learn the basic Arabic grammar in a practical way. • To develop an eagerness among the students to explore the last divine Book.
Course Contents:	• تیسواں پارہ - ناظرہ مع تجوید • بنیادی عربی گرامر اسم اور اسکے متعلقات : اسم فاعل ،مفعول ،تفضیل ،مبالغہ فعل اور اسکی اقسام : ماضی ،مضارع ،امر ، نہی حرف اور اسکی اقسام : حروف علت ،حروف جارہ ،مشبہ بالفعل
Memorization:	تیسویں پارے کی آخری بیس سورتیں (حفظ مع ترجمہ)

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ANSC-5111 **Introduction to Farm Animal Health** **3(2-1)**

This course will help to improve the knowledge of students about health and diseases of farm animals, which is to be applied in their professional life. Farmers can improve the health, welfare and productivity of their animals through animal health planning. Animal Health Planning is a continuous improvement method that encourages the development of health building and disease control measures appropriate to the particular farm circumstances leading to a system that is progressively less dependent on veterinary medicines without jeopardizing welfare. A farm animal health plan is an active management tool aimed at promoting the health and welfare of farm animals by setting out disease prevention, detection and management procedures. It should be based on farm specific issues and at its most basic, it should be ensure that illness, injury and mortality amongst farmed animals are at minimum levels. More progressively, it should also be seen as providing procedures that promote positive health and welfare. This course will provide a comprehensive knowledge about vaccines and vaccination schedules of common diseases of our farm animals. Students will be able to collect samples for disease diagnosis.

CONTENTS

Theory

1. Concept of farm animal medicine/herd medicine
2. methods of prevention and control of diseases in farm animals
3. recognition of systemic disorders and introduction to bacterial, viral, fungal, parasitic and metabolic disorders in farm animals
4. biosecurity on farms , systemic disorders
5. Bacterial and viral diseases:
6. fungal diseases: ring worm, aspergillosis, histoplasmosis, dermatophilosis, candidiasis, degnala disease and mycotoxicosis
7. parasitic diseases: coccidiosis, bebesiosis, and theileriosis
8. diseases caused by nematodes, cestodes, termatodes and arthopodes
9. metabolic disorders and deficiency diseases: parturient haemoglobinuria, milk fever, transit tetany, lactation tetany, hypomagnasemic tetany, ketosis
10. vitamin and mineral deficiencies/imbalances
11. poultry diseasess: gumboro, ND, pullorum, CRD etc.

Practical

1. Vaccination and deworming schedule for farm animals
2. mastitis microbiology; evaluation of milking machine
3. microbiological examination of milk and other dairy products for potential human pathogens
4. Diagnostic techniques for brucellosis, hydatidosis etc.
5. detection of milk and other dairy products, manual and computerized farm records

Recommended Texts

1. Har pal singh, amresh kumar, p c chauduri (1990). *Veterinary clinical guide:* Kalyani Publishers
2. . D.C Blood, O.M. Radostits, J.A Henderson (2010). *Veterinary Medicine*: University of Minnesota.

Suggested Books

1. Khan, B.B. (2008). *Health and Husbandry of Dairy Animals.* Faisalabad, Pakistan: Pak TM. Printers.
2. Hungerford. T. G. (1991). *Hungerford's Disease of Livestock* (9th ed.). Sydney: McGraw-Hill Book Company.

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AGRO-5904 **Field Crop Production** **3(2-1)**

This course is aimed at acquainting the students with the basic concepts of Agronomy and crop production. It has been designed to develop understanding among students about the production technology of major and minor field crop grown under the agro-ecological conditions of Pakistan. In addition, the commonly followed cropping systems schemes and patterns by the farmers in the country are also discussed in detail indicating the potential opportunities and issues. It also deals with the scientific management of crop environment and pests of field crop cultivated in the country. This course contains the practical aspects of crop production such as demonstration of improved sowing methods, intercultural operations, harvesting and threshing. The student will have a comprehensive knowledge of the production of crop from sowing to the harvesting.

Contents

Theory

1. Introduction to field crops
2. Different growth stages of field corps
3. Cropping scheme, cropping patterns, cropping systems, cropping intensity.
4. Production technology of major field crops: cereals (wheat, rice, maize).
5. Sugar crop (sugarcane) and fiber crop (cotton).
6. Traditional oil seed crops (rapes, mustards, peanut, sesame etc.).
7. Non-traditional oil seed crops (sunflower, soybean
8. Grain legumes (chickpea, lentil, green gram, black gram).
9. Fodders (berseem, lucerne, sorghum).

Practical

1. Identification of crops and their seeds.
2. Demonstration of improved sowing methods of crops.
3. Delinting of cotton seed.
4. Raising of crop nurseries and transplanting.
5. Intercultural practices.
6. Seed Inoculation.
7. Seed treatment with fungicides.
8. Demonstration of harvesting and threshing operations.
9. Field visits.

Recommended Texts

1. Balasubramaniyan. (2004). *Principles and Practices of Agronomy,* Jodhpur, India, Agrobios.
2. Khalil, I.A. and Jan, A. (2002) *Cropping Technology.* Islamabad, National Book Foundation.

Suggested Readings

1. Martin, J.H. Waldren, R.P. and Stamp, D.L. (2006). *Principles of Field Crop Production,* 4th Ed. New York, The McMillan Co.
2. Nazir, M.S., Bashir, E. and Bantel, R. (Eds.). (1994). *Crop Production*, Ed. E. Bashir & R. Bantel, Islamabad, National Book Foundation.

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SAES-5802 **Introduction to Soil Science-II** **2(1-1)**

This is the continuity of course taught in first semester designed to introduce the concept and importance of soil science for agriculture students at under-graduate level. It provides information to the students about chemistry of soils; especially soil colloids and their environmental significance. How organic matter play a role for enhancing availability of macro and micro nutrients from soil environment. This subject also clears the concept of students about soil pH and its significance regarding nutrients availability from soil to plant. This course also delivers knowledge to the students how to use sagaciously essential elements for better crop growth and production. Acquisition of specific and technical understanding of the students to select best management strategies for soil reclamation and land evaluation. In addition, this introductory course also improves the skills of the students how to calculate percent nutrients in available fertilizer and their chemical analysis about their percent grade.

Theory

1. Soil colloids and clays: description and environmental significance
2. Cation and anion exchange properties of soil and their significance; basic cation saturation percentage
3. Soil pH and its importance
4. Soil organic matter: sources, composition and significance
5. Elements essential for plant growth: macro and micro nutrients, organic and inorganic fertilizers
6. Salt-affected and waterlogged soils: types, reclamation and management
7. Soil erosion: causes and remedies: soil and water conservation

Practical

1. Fertilizers: Identification, composition and calculation of nutrient percentage
2. Fertilizer analysis for N, P and K
3. Soil analysis for EC and pH
4. Determination of soil organic matter

Recommended Texts

1. Bashir & Bantel. (2001). *Soil Science*. Islamabad, National Book Foundation.
2. Brady, N.C. & R.R. Weil. (2007). *The Nature and Properties of Soils* (14th ed.). Upper Saddle River, NJ, USA, Pearson Education.

Suggested Readings

1. Brady, N.C. & R.R. Weil. (2009). *Elements of the Nature and Properties of Soils* (3rd Ed.). Upper Saddle River, NJ, USA. Pearson Education.
2. Hillel, D. (2008). *Soil in the Environment: Crucible of Terrestrial Life.* Burlington, MA, USA. Elsevier Inc.
3. Singer, M.J., & Munns, D.N. (2002). *Soils - An Introduction.* (5th ed.). Upper Saddle River, NJ, USA. Prentice-Hall, Inc.

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AEXT-5402 **Communication skills in Agricultural Extension** **2(2-0)**

The world has now embraced the largest revolution so far in the history of mankind called communication revolution. Everything has been tagged to communication. Where countries are unable to resolve their issues through wars, communication provides the way to resolve mutual conflicts not only between two individuals, groups but also between the countries. Communication has lot more importance in the human growth and development. The main aim of this course is to develop effective communication skills among students. How to develop communication ethics and techniques with other stakeholders in the society is also important to learn. At the end of this course, the students will be able to: define the given concepts of communication, identify the types of communication, conduct interviews and will be able to demonstrate improved communication skills.

Contents

1. Concept, Purpose and scope of communication in Agricultural extension;
2. Forms of communication in the past, present and future;
3. Communication process, elements and their role in effective communication;
4. Principles of communication and Basic communication models;
5. Forms of communication: interpersonal, intrapersonal and impersonal; Written, verbal and non-verbal communication;
6. Barriers to communication and measures to overcome these barriers.

Recommended Texts

1. Calvert, P. (2000). *The communicator's Handbook. Tools, Techniques and technology* (4th ed.). USA, Maupin House Publishing.
2. Muhammad, S. (2005). *Communication Skills & Leadership Development.* Faisalabad, Unitech Communications.

Suggested Readings

1. Murphy, H. A., Hildebrandt, H. P. & Thomas, J. P. (2000). *Effective business communication.* International Series. Islamabad, NBF.

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SEMESTER-III

URCG-5119 **Expository Writing** **3 (3-0)**

This course prepares undergraduates to become successful writers and readers of English. The coursehelps students develop their fundamental language skills with a focus on writing so that they can gainthe confidence to communicate in oral and written English outside the classroom. The course is dividedinto five units and takes a Project-based Learning approach. Unit themes target the development of 21st 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. Theywill 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 tasksand skills* (3rd ed.). Ann Arbor: The University of Michigan Press.

Suggested 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.

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General Education Cluster: Quantitative Reasoning

URCG-5121 **Tools for Quantitative Reasoning** **3(3-0)**

This is a sequential undergraduate course that focuses on logical reasoning supported with mathematical and statistical concepts and modeling / analysis techniques to equip students with analytical skills and critical thinking abilities necessary to navigate the complexities of modern world. The course is designed to familiarize students with the quantitative concepts and techniques required to interpret and analyze numerical data and to inculcate ability in students the logical reasoning to construct and evaluate arguments, identify fallacies, and think systematically. Keeping the pre-requisite course of Quantitative reasoning (I) as its base, this course will enable students further their quantitative. Logical and critical reasoning abilities to complement their specific major field of study

Course Learning Outcomes

By the end of the course, student shall have:

1. Understanding of logic and logical reasoning:
2. Understanding the basic quantitative Modeling and Analyses.
3. Logical reasoning skills and abilities to apply them to solve quantitative problems and evaluate arguments;
4. Ability to critically evaluate quantitative information to make evidence based decisions through appropriate computational tools.

Contents

1. Logic, Logical and Critical Reasoning:
    i. Introduction and importance of logic,
    ii. Introductive, deductive and abductive approaches of reasoning,
    iii. Propositions, arguments (valid; invalid), logical connectives, truth tables and propositional equivalences,
    iv. Logical fallacies,
    v. Venn Diagrams,
    vi. Predicates and quantifiers,
    vii. Quantitative reasoning exercises using logical reasoning concepts and techniques.

2. Mathematical Modeling and Analyses:
    i. Introduction to deterministic models,
    ii. Use of linear function for modeling in real-world situations,
    iii. Modeling with the system of linear equation and linear solutions,
    iv. Elementary introduction to derivatives in mathematical modeling,
    v. Linear and exponential growth and decay models,
    vi. Quantitative reasoning exercises using mathematical modeling.

3. Statistical Modeling and Analyses:
    i. Introduction to probabilistic models,
    ii. Bivariate analysis, scatter plots,
    iii. Simple linear regression model and correlation analysis,
    iv. Basics of estimation and confidence interval,
    v. Testing of hypothesis (z-test; t-test),
    vi. Statistical inference in decision making,
    vii. Quantitative reasoning exercise using statistical modeling.

Recommended Texts

1. Bennett, J., & Briggs, W. (2019). *Using & understanding mathematics: a quantitative reasoning approach*. Pearson.
2. Rosen, K. H., & Krithivasan, K. (2012). *Discrete mathematics and its applications* (Vol. 6). New York: McGraw-Hill.

Suggested Readings

1. Epp, S. S. (1990). *Discrete mathematics with applications*. Wadsworth Publ. Co..
2. Budnick, F. S., Quinn, S., Bowser, K., & Flaherty, E. H. (1993). *Applied mathematics for business, economics, and the social sciences*. New York: McGraw-Hill.
3. Bluman, A. (2014). *Elementary Statistics: A step by step approach 9e*. McGraw Hill.
4. Mann, P. S. (2007). *Introductory statistics*. John Wiley & Sons.
5. Babones, S. (2013). Applied statistical modeling. *(No Title)*.
6. Green, S. W., Wolf, I.k., Stewrat, B. W. (2022). SAT Study Guide Premium. Barrons

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URCG-5122 **Ideology and Constitution of Pakistan** **2(2-0)**

Course Description:
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

Outline:

- **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.
- **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
- **Fundamental rights**
- **Principles of policy**
- **Federation of Pakistan**
  President
  Parliament
  The Federal Government
- **Provinces**
  Governors
  Provincial Assemblies
  The Provincial Government
- **The Judicature**
  Supreme Court
  High Courts
  Federal Shariat Courts
  Supreme Judicial Council
  Administrative Courts and tribunals
- **Islamic Provisions in Constitution**
- **Significant Amendments of Constitution of Pakistan 1973**

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

FSAT-5101 Introduction to Food Science and Technology 3(2-1)

This is an introductory course which enables the students to understand the basics of food science and technology. Students will explore and gain an understanding into the history of Food Science and the factors that have shaped Food Science in Pakistan, the organizations involved in Food manufacturing, food regulatory processes, Food composition, its classification depending on sources, consumption pattern and basic analysis of food components. The course is the study of the physical, biological, and chemical makeup of food; the causes of food deterioration; and the concepts underlying food processing. Food scientists and technologists apply scientific disciplines including chemistry, engineering, microbiology, and nutrition to the study of food to improve the safety, nutrition, wholesomeness and availability of food. Depending on their area of specialization, food scientists may develop ways to process, preserve, package, and/or store food according to industry and government specifications and regulations. It could involve enhancing the taste, making it last longer, making sure it's safe to eat, or even boosting its nutritional content.

CONTENTS

Theory

1 Introduction to food science, food technology, relationship with other disciplines
2 Career opportunities. Significance of food science and technology
3 Food industry: history, developments, important food industries in Pakistan
4 Food sources: plants, animals and marine
5 Food constituents and their functions: water, carbohydrates, lipids, proteins, vitamins, minerals.
6 Classification of foods on the basis of perishability and pH
7 Food spoilage agents: enzymes, microorganisms, pests, physical factors
8 Principles of food preservation: prevention or delay of autolysis, microorganisms and pests

Practical

1 Use of basic food laboratory equipment.
2 Estimation of Moisture, Fat, Protein, Carbohydrates, Fiber and Ash content in food samples.
3 Determination of soluble solids, total solids, pH, Acidity, total sugars, Specific gravity and Refractive index.

Recommended Books

1 Awan, J. A. (2018). Food science and technology. Faisalabad-Pakistan: Unitech Communications.
2 Robert, L. S., Ramirez, A. O., Clarke, A. D. (2015). Introducing Food Science. 2nd Ed. CRC Press.

Suggested Readings

1 Stewart, G. F., & Amerine, M. A. (2012). Introduction to food science and technology. Elsevier.
2 Potter, N. N., & Hotchkiss, J. H. (2012). Food science. Springer Science & Business Media.

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ENTO-5101 **Introductory Entomology** **2 (1-1)**

This course is aimed to make the students familiar with the basic information about the study of insects. The students would be able to know about arthropods and especially insects with their morphological features, identify insects of economic importance and acquire working skills for collecting, mounting, and preserving insects. Course briefs about the basic external and internal morphological and anatomical features along with their basic functioning principles. Students will learn as well about the insect classification and nomenclature. They can easily identify the insect order, family and type and can properly collect, mount and preserve these invertebrates for further studies. Insect body features and their habits help for their identification. This is the basic course that enables the students to further understand the ways and techniques adopted for the control and management of economically important insect pests.

Contents (Theory)

1 Introduction
2 Phylum Arthropoda and its classification
3 Metamorphosis and its types
4 Briefs of external and internal morphology and physiology with a particular reference to typical insect, 'ak' grasshopper, *Poekilocerus pictus*
5 Introduction to classification of class Insecta

Contents (Practical)

1 Collection and preservation of insects
2 Morphology and dissection of a typical insect (digestive, reproductive, excretory, nervous, circulatory and tracheal systems)
3 Temporary mounts of different types of appendages of insects

Recommended Texts

1. Lohar, M.K. (1998). *Introductory Entomology*, Kashif Publications, Hyderabad, Pakistan.
2. McGavin, G. C. (2001). *Essential entomology: an order-by-order introduction*. USA: Oxford University Press.

Suggested Readings

1. Tonapi, G.T. (1994). Experimental Entomology, an Aid to Lab. and Field Studies. Dehli: C.B.S. Publishers and Distributors.

Mani, M.S. (1990). General Entomology (4th ed.) Dehli: Oxford & IBH Publishing Co. Pvt. Ltd.

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PLPT-5302 **Introductory Plant Pathology** **2(1-1)**

Plant pathology is a science that studies plant diseases and attempts to improve the chances for survival of plants when they are faced with unfavorable environmental conditions and parasitic microorganisms that cause disease. As such, plant pathology is challenging, interesting, important, and worth studying in its own right. It is also, however, a science that has a practical and noble goal of protecting the food available for humans and animals. Plant diseases, by their presence, prevent the cultivation and growth of food plants in some areas; or food plants may be cultivated and grown but plant diseases may attack them, destroy parts or all of the plants, and reduce much of their produce, i.e., food, before they can be harvested or consumed. The objective of this course is to acquaint the students with basic concepts and identification of plant pathogens. The course covers all aspects of plant pathogens which include their economic importance, morphology, reproduction and ecology. The course also covers classification of different plant pathogens. In addition to plant pathogens, phanerogamic parasites, viroids and fastidious bacteria will also be covered briefly during this course.

Theory

1. Introduction and economic importance.
2. Identification and characteristics of fungi and prokaryotes.
3. Identification and characteristics of viruses, viroids and nematodes.
4. Identification and characteristics of fungus like organisms and phanerogamic parasites

Practical

1. Orientation of laboratory equipment
2. Sterilization of glassware
3. Preparation of media and isolation of different plant pathogens
4. Study of characteristics of various plant pathogens through slides
5. Live specimens and their comparative account/study

Recommended Texts

1. Agrios, G. N. (2005). *Plant Pathology* (5th ed.). Burlington, MA. USA, Elsevier Academic Press.
2. Ahmad, I., & Bhutta, A.R. (2005) *Textbook of introductory Plant Pathology*. Islamabad, NBF Publisher.

Suggested Readings

1. Bos, L. (1999). *Plant viruses, unique and intriguing pathogens: a textbook of plant virology*. Netherlands, Backhuys Publishers.
2. Mehrotra, R. S., & Aggarwal, A. (2003). *Plant Pathology* (2nd ed.). India, Tata McGraw Hill Education (India) Private Limited.
3. Ravichandra, N. G. (2013). *Fundamentals of plant pathology*. India, PHI Learning Pvt. Ltd.
4. Windham, M. T., Trigiano, R. N., & Windham, A. S. (2003). *Plant pathology: concepts and laboratory exercises*. UK, Taylor and Francis.

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AGEC-5501 Principles of Agricultural and Resource Economics 2(2-0)

This course that provides a comprehensive overview of the economic principles that underpin agriculture and natural resource management. This course explores the production, distribution, and consumption of agricultural goods and resources from both theoretical and practical perspectives. It covers a wide range of topics, including market structures, consumer behavior, production and cost analysis, farm management, environmental economics, and international trade. Students will learn how to analyze and evaluate policies and strategies that affect agriculture and resource management, as well as the economic factors that shape decision-making in the industry.

Contents

1. Introduction to Agricultural and Resource Economics
2. Market structures and competition
3. Consumer behavior and demand analysis
4. Production and cost analysis
5. Farm management and decision-making
6. Environmental and natural resource economics
7. International trade and globalization

Recommended Texts

1. Agricultural and Food Policy" by Ronald D. Knutson, J.B. Penn, and Barry L. Flinchbaugh
2. Environmental and Natural Resource Economics" by Tom Tietenberg and Lynne Lewis
3. Parkin, M. (2010).*Economics*, 10th Edition, Addison Weslay Publishing Company.

Suggested Readings

1. Mankiw, N. Gregory. (2011). *Principles of Economics,* 5th Edition. Mason: South-Western Cengage learning Publisher.
2. Penson, J. B., Capps, O., Rossen C. P., & Woodward, R. (2013). *Introduction to Agricultural Economics,* 5th Edition. New Jersey: Prentice Hall.
3. Cramer, G., Jensen C. W., & Southgate, D. D. (2001). *Agricultural Economics and Agribusiness,* 8th Edition. Wiley Publisher.

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HORT-5601 **Introductory Horticulture** **2(1-1)**

This course is aimed to make the students familiar with the basic information about the study of horticultural plants such as fruits, vegetables and ornamental plants. The course covers all aspects of Horticultural crops. The student will learn the division of horticulture and classification of horticultural plants as well as plant parts and their modifications. This course would help understand students regarding, propagation methods, punning, training and laying out of an orchard, vegetable farm This course will help students to identify the key issues being faced by the growers such as purchasing of plants from nursery, establishing an orchard, pruning, training and wind breaks. Taking this course would broaden their vision regarding the horticulture industry at domestic and international level. Students will be able to identify existing gaps and will be trained to solve those issues.

Contents

1. Introduction, history, importance and future scope
2. Definition and divisions of horticulture
3. Classification of horticultural crops, Plant parts, their modifications and functions
4. Concise account of Plant environment; climate (temperature, light, humidity etc) and soil (structure, texture, fertility etc)
5. Brief account of Phases of plant growth and Propagation of horticultural plants

Practical

1. Visit of nurseries, commercial gardens and public parks
2. Identification and nomenclature of important fruits, vegetables and ornamental plants
3. Garden tools and their uses, Media and its preparation.
4. Techniques of propagation

Recommended Texts

1 Christopher, E. P. (2012). *Introductory Horticulture*. New Dehli, India, Biotech books

2 Carrol,L., J.R.Shry and H.E. Reily. (2011). *Introductory Horticulture* (8th Ed.) Albany, USA, Delmar-Thomson Learning.

Suggested Reading

1 Hartmann, H.T., D.E. Kester, E.T. Davies and R.L. Geneve. (2009). *Plant Propagation–Principles and Practices* (7th Ed.). New Delhi, India, Prentice-Hall India Learning Pvt. Ltd.

2 Peter, K.V. (2009). *Basics of Horticulture*. New Dehli, India, New India publishing Agency.

3 Reddy, R. and Shanker J.P.A. (2008). *Horticulture*. Commonwealth Publishers.

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SEMESTER-IV

URCG-5115 **The Science of Global Challenges** **3 (2-1)**

Climate Change i.e., Global Warming, Natural and Anthropogenic Activities and their impact; **Energy** i.e., Renewable and non-renewable energy resources; **Water Security** i.e., water scarcity andwaste water treatment; **Land Degradation** i.e., salinity, water logging, deforestation, land erosion; **Food Security** and roll of Biotechnology in food production; **Global Health Pandemics** i.e., Infectious diseases, vaccine, development of drug discovery for newly explored diseases

Practical:

1: Preparation of standard solution and their standardizations
2: Soil and Water Analysis

Recommended Text:

Usman, M. (2022). *Science of Global Challenges*. Ilmi Kitab Khana, Lahore

Suggested Readings

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*, 1st Edition, Revised, USA:Paradigm Publication.
3: Karaduman, I. C. (Ed.) (2014) *Global Challenges for the world.* Obronnosc. Zeszytl Naukowe. Turkey

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URCG-5124 **Entrepreneurship** **2(2-0)**

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.

Course Learning Objectives

1. To enhance the 'entrepreneurial intentions' of the students by improving their natural willingness to start a business.
2. To understand the process of entrepreneurship and learn the ways to manage it by working individually in the class and in the form of groups outside the class to conduct field assignments.
3. To educate the students about the practical underpinnings of the entrepreneurship with the aidof practical assignments and idea pitching.

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 Texts:

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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..

Suggested Readings:

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

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URCG-5125 **Civics and Community Engagement** **2(2-0)**

Course Description:

The Civics and Community Engagement course is designed to provide students with an understandingof 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 responsiblecitizenship.

Learning outcomes

After completing this course, students will be able to

- Understand the concepts of civic engagement, community development, and social responsibility.
- Understand rights and responsibilities of citizenship
- Understand cultural diversity in local and global context
- Analyze the significance of civic participation in promoting social justice, equity, and
- democracy.
- Examine the historical and contemporary examples of successful civic and community engagement initiatives.
- Identify and assess community needs, assets, and challenges to develop effective strategiesfor community improvement.
- Explore the ethical implications and dilemmas associated with civic and community engagement.
- Develop practical skills for effective community organizing, advocacy, and leadership.
- Foster intercultural competence and respect for diversity in community engagement efforts.
- Collaborate with community organizations, stakeholders, and fellow students to design and implement community-based projects.
- Reflect on personal growth and learning through self-assessment and critical analysis of community engagement experiences.

Course Content:

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

Citizenship and Community Engagement

- ☐ Introduction to Active Citizenship: Overview of the Ideas, Concepts, Philosophy and Skills
- ☐ Approaches and Methodology for Active Citizenship

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

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

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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)

Human rights, constitutionalism and citizens' responsibilities

- Introduction to Human Rights
- Human rights in constitution of Pakistan
- Public duties and responsibilities
- Constitutionalism and democratic process

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

Civic Engagement Strategies

- Grassroots organizing and community mobilization
- Advocacy and lobbying for policy change
- Volunteerism and service-learning opportunities

Social issues/Problems of Pakistan

- Overview of major social issues of Pakistani society

Social Action Project

Recommended Books:

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

Reference Books:

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 andDemocracy in the United States. Kettering Foundation Press.
4. Bloemraad, I. (2006). Becoming a Citizen: Incorporating Immigrants and Refugees in the UnitedStates 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 toArgumentation (8th ed.). Routledge.
8. Kretzmann, J. P., & McKnight, J. L. (1993). Building Communities from the Inside Out: A PathTowards Finding and Mobilizing a Community's Assets. ACTA Publications.
9. Patterson, T. E. (2005). Engaging the Public: How Government and the Media Can ReinvigorateAmerican Democracy. Oxford University Press.
10. Love, N. S., & Mattern, M. (2005). Doing Democracy: Activist Art and Cultural Politics. SUNY Press.

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URCG-5111 **Translation of the Holy Quran - II** **Non-Credit**

Topic	Details
Semester/Level	In some discipline 3rd semester and in some discipline 4th Semester/ ADP Program 2nd Year
Objectives	▪ 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. ▪ Students will seek knowledge of translation and transliteration of the Holy Book Quran. ▪ To familiarize the students with the concept of Ibādah (Its significance, scope and relevance) and its types in Islam. ▪ Students will learn literal and idiomatic way of translation of the Holy Book. ▪ Students will learn about the polytheism and its incompatibility in Islam highlighted by the Holy Quran. ▪ 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. ▪ To develop Awareness among the students about rights and duties of different circles of society in the light of Holy Quran. ▪ To introduce the students to Quranic Arabic grammar in practical manner.
Course Contents:	○ ایمانیات اور عبادات اللہ پر ایمان ،فرشتوں پر ایمان ،رسولوں پر ایمان ،آسمانی کتابوں پر ایمان یوم آخرت پر ایمان ، تقدیر پر ایمان نماز ،روزہ ،زکوۃ،حج ،جہاد ○ معاشرے کے حقوق • خاندان کی تکوین • حق مہر • رضاعت و حمل • اولاد کو قتل کرنے کے ممانعت • شوہرکی نافرمانی • طلاق • بیوہ کی عدت کے احکام • نکاح کا پیغام بھیجنا • عورت کی وراثت (اس کے شوہر کی طرف سے) • والدین کے حقوق • بیویوں اور اولاد کے بیچ عداوت ○ خاندان کے حقوق • مہمان کی عزت • اجازت طلب کرنے کے اصول • مجلس کے آداب • تعاون اور بھائی چارہ • گروہ بندی • محبت • لوگوں کے درمیان صلح • عفو ودرگزر، غصہ پر قابو اور معاف کرنا • شعوب و قبائل • لوگوں کے بیچ اختلافات • حمایت و نگہبانی
Grammar:	• قرآنی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of	▪ منتخب آیات مع ترجمہ وتجوید

Chapters and verse Numbers:	▪ البقره ((١٧٧، ٢٣٨، ٣٥، ٢٧٧، ٢١٩، ١١٠، ٣٥، ١٥٣، ٢٣٧، ٢٠١، ٢٨٥، ٣٣، ٢٨٥، ١٥، ١٢٩، ٢٥٣، ٩٨، ٦٢، ١٢٦، ٢٨٥، ٢٥٦، ١٧٧، ١٣٦، ١٨٩، ٢٠٠، ١٨٣، ١٨٣، ٢١٨، ١٥٨، ٢٣١،١٩٩، ٢٢٧، ٢٢٦، ٢٣٧، ٢٢٨، ٢٢٩، ٢٣١، ٢٣٧، ٢٣٥، ٢٣٠ ، ٨٢ ، ١٨٣، ٢٣٣، ١٨٢، ١٦٠، ٨٣) ▪ النساء (٩٥، ٩٢، ٥٩، ١٣٦، ٦٩، ٨٠، ١٣، ٦٩، ٨٦،٨٠، ٣٦، ١٧٦، ١٢، ٣٥، ١٢٨، ٣٣، ١١، ٣، ١٧٦، ٢٣، ٢٥، ١١، ١١، ١٢٨، ١٩١، ٣٥، ٢٠، ٣٥، ١٩١، ٦، ١، ٢٠، ١، ١٦، ١٣٦، ٥٣، ١٢٨، ٨١) ▪ الانعام (٢٢، ١٣٧،١٣،٩٢، ١٥١، ٣٨، ٥٣) ▪ آل عمران (٩٧، ٣٩، ٨٥، ١٢٥، ٨٣، ١٣٣، ١٩،١) ▪ المائده (٥٣، ٢، ٩٢، ٣٩،١٩، ٨٢، ٢، ٥) ▪ الاعراف (٣٥، ١٨٩، ١٨٩) ▪ التوبہ (٢٠، ٧١،١٦) ▪ ہود (١٢) ▪ الزمر (٦) ▪ النور (٥٣، ٢٨،٥٢، ٢٧، ٦٠، ٢٩) ▪ محمد (٣٣) ▪ انفال (٨٢، ٢٠) ▪ الرعد (٣) ▪ الطلاق (٣) ▪ الحج(٥) ▪ ابراہیم ((٢٣،٣٣) ▪ الاسراء (٢٣، ٢٣) ▪ الاحقاف (١٥) ▪ المومنون (٢٧) ▪ العنکبوت (٢٥،٣٨، ٨) ▪ النحل (٢٢) ▪ لقمان (١٥،٣، ١٣) ▪ الاحزاب ((٣٥، ٥٠،٣٨، ٣٩) ▪ الشعراء (٧) ▪ الروم (٢١) ▪ مزیم (١٣،٢٦) ▪ المجادلہ (١٢، ١١)

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STAT-5126 **Statistics for Agricultural Sciences** **3(3-0)**

This course is designed for under graduate programs of agriculture sciences. The objective of this course is to impart basic and applied knowledge about statistics for collection, presentation, analysis and interpretations of data related to agriculture issues. After completing this course agriculture students will be able to understand the general concepts of basic statistics, to conduct agriculture surveys, to understand design of experiments, and other statistical tools. These statistical concepts are further will be helpful to complete a research related to agriculture sciences. Moreover over students will also learn some statistical softwares such as Minitab, SPSS and Design Expert to improve their computational and analytical skills. This course will be able to understand and analyze the agricultural problems in field as well as in lab conditions.

Contents

1. Definition and importance of Statistics in Agriculture.
2. Data, Different types of data and variables
3. Classification and Tabulation of data.
4. Frequency distribution, Graphical representation of data.
5. Measure of Central tendency and Measure of Dispersion. Calculation of averages, Range, variance, Standard deviation and coefficient of variation.
6. Regression and Correlation Analysis: Simple and Multiple regression, correlation cases.
7. Sampling and its types: Probability and non-Probability Sampling, Simple random sampling, stratified random sampling, Systematic sampling, Sampling and non-sampling error
8. Sampling distribution of mean and difference between two means.
9. Inference Theory: Estimation and testing of hypothesis, Type-I and type-II error, Testing of hypothesis about mean and difference between two means using Z-test and t-test, Paired t-test.
10. Test of association of attributes using χ^2 (chi-square) Testing hypothesis about variance.
11. ANOVA and its assumptions, One-way ANOVA, Two-way ANOVA.

Recommended Texts

1. Muhammad, F. (2000). *Statistical methods and data analysis*. Pakistan: Ilmi Kitab Khana.
2. Rao, G. N. (2007). *Statistics for agricultural sciences* (2nd ed.). BS Publication.

Suggested Readings

1. Lawal, B. (2014). *Applied statistical methods in agriculture, health and life sciences*. USA: Springer.
2. Sahu, P. K. (2016). *Applied statistics for agriculture, veterinary, fishery, dairy and allied fields*. USA: Springer.
1. Crawshaw, J. & Chambers, J. A. (1994). *Concise course in A. level statistic with world examples*. USA: Springer.

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PLBG-5202 **Introductory Plant Breeding** **2(1-1)**

Students will understand: the basis of plant breeding, The application of genetic principals for the improved heredity of plants. How to improve yield, quality, disease-resistance, drought and frost-tolerance and important characteristics of the crops. This manipulation involves either controlled pollination, genetic engineering, or both, followed by artificial selection of progeny. The process of creating variation and then utilizing the variation for the plant improvement. Application of genetic principles in crop improvement, understanding breeding methods in self-pollinated crops and the principal of breeding self-pollinated crops as homozygosity. Comparative advantage of different breeding methods in terms of time required for breeding a crop variety. Understanding breeding methods in cross pollinated and vegetative propagated crops.

Contents
Theory

1. Introduction to plant breeding and its role in crop improvement.
2. Breeding self-pollinated crops: introduction, mass selection, pure line selection; hybridization, pedigree method, bulk method and backcross techniques.
3. Breeding cross-pollinated crops: introduction, mass selection, recurrent selection.
4. Breeding clonally propagated crops.
5. New trends in plant breeding.

Practical

1. Descriptive study of floral biology.
2. Scientific names, chromosome number and ploidy level of important field crops.
3. Selfing and crossing techniques in major crops.
4. List of approved varieties in major field crops.
5. Field visits of different research organizations.

Recommended Texts

1. Sleper, D. A. & Poehlman, J.M. (2006)). *Breeding Field Crops*. (5th ed.) Ames, USA, Iowa State University Press.
2. Chahal, G.S. & Gosal, S.S. (2003). *Principles and Procedures of Plant Breeding*. New Delhi, India, Narosa Publishing House.
3. Singh, B. D. (2003). *Plant Breeding: Principles and Methods*. New Delhi, India, Kalyani Publishers.

Suggested Readings

1. Singh, P. (2003). *Essentials of Plant Breeding*. New Delhi, India, Kalyani Publishers.
2. Khan, M.A (Editor). ((1994). *Plant Breeding*. Islamabad, National Book Foundation.
3. Acquaah, G. (2009). *Principles of Plant Genetics and Breeding*. UK, John Wiley & Sons.

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ENTO-6112 Stored Product Pests and their Management 3 (2-1)

This course aims to clear the concepts of stored product pest management, food storage principles and storage losses incurred by different insect and mite pests. Students will learn about the basic sampling strategies being used for pest scouting in storage industry and about the biological and ecological aspects of each major stored grain insect or mite pests and will be able to understand different factors affecting grain and other stored food products in storage structures. They can collect, preserve and identify different stored grain insect pests and will also learn about how to rear some of these stored grain insect pests for different studies.

Contents

Theory

1 Introduction
2 Identification
3 Biology and management of different stored product pests
4 Principles and types of storages
5 Factors affecting grain and other products in storages
6 Stored product losses and their prevention

Practical

1 Visits to different godowns and demonstration of sampling methods
2 Collection, identification and management of different stored product pests
3 Culture of some stored products insect pests under different climatic conditions

Recommended Texts

1. Ashfaq, M. Saleem, M. A. & Ahmad, F. (2009)*Zari Ajnaski Mahfooz Zakhira Kari* (in Urdu). Lahore: Pak Book Empire, Lahore.
2. Hill, D.S. (2002). *Pests of Stored Food Stuffs and Their Control.* Berlin:Kluwer Academic Publishers.

Suggested Readings

1. Rees, D. (2009). *Insects of Stored Products.*New York: Manson Publishing Company.
2. Zaklandvoi, G. A. & Ratanova. V. F. (1987). *Stored Grain Pests and their control.* London: Oxonian Press Pvt. Ltd.

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PLPT-6315 **Plant Disease Management** **3(2-1)**

Plant Disease Management course has been designed to acquaint the students with recent developments in the management of different plant diseases. In this course, the students will be taught about different types of resistance in crop plants, biological, physical and chemical control of plant diseases. The main objective of this course is to introduce the students about plant disease management practices. At the completion of the course the students will be able to understand: About concepts and techniques of plant disease management. Principles and methods of plant disease management based on avoidance, exclusion, eradication of pathogens, protection (preventive and curative) and resistance (pathogen derived resistance, host resistance).

Theory

1. Principles and methods of plant disease management based on avoidance, exclusion, eradication of pathogens, protection (preventive and curative) and resistance (pathogen derived resistance, host resistance)
2. Management of plant diseases with emphasis on regulatory, cultural, biological, physical and chemical strategies; integrated disease management (IDM) seed health certification system
3. Philosophy of TOF (Training of Facilitators) and FFS (Farmer Field School)
4. Epidemiological basis of disease management strategies, concept of field biodiversity, conservation and crop appraisal.

Practical

1. Demonstration of different disease management practices
2. Equipment and machinery used for disease management and their calibration; safety measures for disease managing chemicals; handling and application procedures
3. Crop Agro Ecosystem Analysis.

Suggested Readings

1. Ahmad, I., M. Aslam and A. Munir. 1992. Phytopathological Diagnostic Techniques. Pakistan Agricultural Research Council, Islamabad, Pakistan.
2. Bashir, M. and S. Hassan. 1998. Diagnostic methods for plant viruses. PARC, Islamabad.
3. Fox, R.T.V. 1994. Principles of Diagnostic Techniques in Plant Pathology. CAB International, UK.
4. Hampton, R., E. Ball and DeBoer, S. 1990. Serological methods for detection and identification of viral and bacterial plant pathogens - A Laboratory Manual. American Phytopathological Press, Saint Paul, Minnesota, USA
5. Hawksworth, D.L. 2000. Plant pathologist pocket book 3rd ed. IMI, Egham, UK.
6. Naqvi, S.A.M.H. 2004. Diseases of Fruits and Vegetables: Diagnosis and Management vol. 2. Springer.
7. Narayanasamy, P. 2001. Plant Pathogen-Detection & Disease Diagnosis. 2nd ed. CRC Press.
8. Schots, A., F.M. Dewey and F. Oliver. 1994. Modern Detection Assays for Plant Pathogenic Fungi. CAB International, UK.
9. Walker, J.M. 1998. Plant clinic handbook. CAB International. Ferry lane, Kew, UK.
10. Waller, J.M., J.M. Lenné and S.J. Waller. 2002. Plant Pathologist Pocketbook. 3rd edition, CABI International, UK.
11. Gangopadhyay, S. 1988. Clinical Plant Pathology. Kalyani Publishers, New Dehli, India.

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AGEC-5502 Agribusiness Management and Marketing 2(2-0)

This course provides a perspective and understanding of the key components of agricultural business management, with a focus on the management tools used to measure business performance. There will be an emphasis on evaluating farm businesses incorporating financial, marketing, production and human resource management tools, decision making techniques, technology adoption and management of risk. After completing the course, students will have developed some understanding of concepts, principles and issues in business management.

Contents

1. Scope of Agribusiness Management
2. Functions of management
3. Forms of business organizations
4. Principles and Techniques of farm planning, operation and management
5. Enterprise budgeting
6. Resource constraints
7. Optimum combinations and alternate business plans.
8. Balance Sheet, income statement and their analysis
9. Benefit Cost Analysis
10. Uncertainty and Risk in Farm Business
11. Risk Management Strategies
12. Supply chain management and Relevant Case studies
13. Role of Government in Agribusiness management.

Recommended Texts

1. Downey, W.D. & Erickson, S. P. (2002). *Agribusiness Management.* Singapore: McGraw Hill Education.
2. Castle, E. N., Becker, M. H. & Nelson, A. G. (2002). *Farm Business Management*, New York: Macmillan.

Suggested Readings

1. Kinsey, B. H. (2002). *Agri. Business and Rural Enterprise*, London: Croom Helm Ltd.
2. Goldberg, R. A., Wilson, L. M., & Austin, J. E. (1974). *Agribusiness Management for Developing Countries*, Cambridge, MA: Ballinger Publishing Company.
3. Buckett, M. (1981). *An Introduction to Farm Organization and Management*, Elsevier Science &Technology Books.
4. Kay, R., Edwards, W., & Duffy, P. (2007). *Farm Management*, 7th Edition. McGraw Hill Education, EU.

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SEMESTER-V

FRMT-6101 Sustainable Agriculture and Organic Farming 3(2-1)

This course introduces the concept and scope of sustainable agriculture, exploring its essential components and significance in modern farming systems. Students will delve into the meaning and principles of organic farming, including a brief historical overview that traces its evolution. The curriculum covers critical topics such as soil and crop management, the role of organic manures like humus, farmyard manure, and sewage sludge, and the application of bio-fertilizers and bio-pesticides. Emphasis is placed on farm waste recycling and the use of organic mulches to enhance soil fertility and structure. By examining organic farming as a vital component of sustainable agriculture, students will gain insights into creating environmentally responsible and productive farming practices.

Theory

1. Concept and scope of sustainable agriculture
2. Components of sustainable agriculture
3. Concept and meaning of organic farming. Brief history
4. Principles of organic farming.
5. Soil and crop management.
6. Organic manures – humus, severe, sludge. Use of bio-fertilizers and bio-pesticides
7. Farm waste recycling, organic mulches
8. Organic farming as a component of sustainable agriculture.

Practical

1. Identification of manure, humus, compost etc.
2. Demonstration of methods for their preparation and application to field/crops;
3. Visit to organic farming areas.

Books Recommended

1. Dahama, A.K. 2002. Organic farming for sustainable agriculture. 2nd enlarged Ed. Agrobios, India.
2. Fossel, P.V. 2007. Organic Farming: Everything you need to know. MBI publishing Co., M.N. 55401, USA.

Suggested Readings

1. Lampkin, N. 2002. Organic Farming. Old Pond Publishing Co. UK. Reddy, S.R. 1999. Principles of Agronomy. Kalyani publishers, India.
2. TNAU, 2017. Manures, Fertilizers and Agrochemicals. AgriMoon Team Publisher, India.

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FRMT-6102 Production Technologies of Major Vegetables 3(2-1)

The "Production Technologies of Major Vegetables" course aims to equip students with comprehensive knowledge and practical skills in cultivating key vegetable crops. It covers modern production techniques, including seed selection, soil preparation, nutrient management, pest and disease control, and post-harvest handling. Students will learn to optimize yield and quality through sustainable practices and advanced technologies. Upon completion, they will be able to implement efficient vegetable production systems, addressing food security challenges and promoting environmentally responsible farming methods.

Content

Theory

1. Importance of vegetable crops in human nutrition and economy.
2. Climatic and soil requirements for major vegetable crops.
3. Varieties and hybrid development in major vegetables.
4. Seedbed preparation and sowing techniques.
5. Nutrient and water management strategies for vegetable crops.
6. Pest and disease management in major vegetables.
7. Protected cultivation technologies (greenhouses, tunnels, and hydroponics).
8. Harvesting techniques and post-harvest handling of vegetables.
9. Role of mechanization in vegetable production.
10. Marketing and supply chain considerations for vegetable crops.

Practical

1. Identification of vegetable seeds and plant varieties.
2. Soil preparation and seed sowing in selected vegetable crops.
3. Fertilizer application techniques and irrigation practices.
4. Hands-on pest and disease management strategies.
5. Demonstration of protected cultivation practices.
6. Harvesting and post-harvest handling exercises.
7. Field visits to commercial vegetable farms and research stations.

Recommended Texts

1. Bose, T. K., & Som, M. G. (1986). *Vegetable crops in India*. Naya Prokash.
2. Rubatzky, V. E., & Yamaguchi, M. (2012). *World vegetables: Principles, production, and nutritive values*. Springer.
3. Peter, K. V. (2008). *Basics of vegetable science*. New India Publishing Agency.

Suggested Readings

1. Singh, B., & Chadha, M. L. (2008). Advances in vegetable production. Researchco Book Centre.
2. Shinohara, T. (2013). Handbook for vegetable growers (5th ed.). Wiley-Blackwell.

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FSAT-6114 **Fruit and Vegetable Processing** **3(2-1)**

The course discusses the biological, chemical and physical properties of fruits and vegetables and their contribution to human nutrition and diet; and the application of food processing and preservation principles and technologies in the processing, preservation, extension of shelf life and value addition of fruit and vegetable products in terms of safety, nutritional and dietary quality. The aim is to equip the students with functional knowledge and practical skills in the principles, technologies and processes used in the processing, preservation, extension of shelf life and value addition of fruits and vegetables. The student will be equipped with knowledge and understanding of the basic properties of fruits and vegetables and their contribution to nutrition and diet, basic post-harvest biological, chemical, physiological and metabolic processes and changes in fruits and vegetables and how these can be controlled to prevent or reduce deterioration and loss of nutritional quality and value in fruits and vegetables production and processing.

Contents (Theory)

1 Heat processing: principles, blanching, exhausting, pasteurization, HTST, UHT, temperature distribution, heat transfer equipment–retorts. commercial sterilization,
2 Canning: unit operations, parameters for canning fruits, vegetables.
3 Thermal death time curves: F value, D value, Z value, calculations.
4 Effect of heat processing: microorganisms. Spoilage of canned foods.
5 Dehydration: principle, methods, dry specific fruit and vegetables.
6 Principles of low temperature preservation: refrigeration, cold storage, freezing, refrigeration plants, monitoring and control.
7 Cold storage: requirements, insulation, air circulation, humidity, controlled atmospheric storage, racking systems, calculation of refrigeration load.
8 Freezing and frozen storage: methods, types, slow and quick freezing, freezing point, freezing curve, rate, changes during freezing, damages during intermittent thawing.
9 Freezing different food commodities, packaging requirements. Defects: freeze burn, drip loss.

Contents (Practical)

1 Preparation of fruits and vegetables products: dried, frozen and canned.
2 Quality evaluation of the products during storage.
3 Manufacturing of pickle, juice concentrate, ready to serve juices, squashes, syrups and fruit candies.
4 Use of edible coating for fruits and vegetables.
5 Visit to fruit and vegetable processing units.

Recommended Texts

1 Siddiq, M., & Uebersax, M. A. (Eds.). (2018). *Handbook of vegetables and vegetable processing.* New Jersey: John Wiley & Sons.
2 Jongen, W. (Ed). (2002). *Fruit and vegetable processing – improving quality.* Cambridge: Woodhead Publishing. Ltd., Abington.

Suggested Readings

1 Girdhari, L., Siddappa, G. S., & Tandon, G. L. (1998). *Preservation of fruits and vegetables.* New Delhi: Publications and Information Division, Indian Council of Agricultural Research.
2 Sirivastava, R. P., & Sanjeev, K. (2002). *Fruit and vegetable preservation: principles and practices.* Lucknow: International Book Distributing Co.

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FRMT-6103 Farm Planning and Budgeting 3(3-0)

This course provides a comprehensive understanding of farm planning and budgeting, focusing on key concepts, definitions, and the functions of farm management, including strategic and tactical approaches. Students will explore the objectives and characteristics of effective farm plans, examining components and steps involved in partial and complete farm budgeting. The course covers essential financial tools such as income statements, net worth assessments, and principles of equity, leverage, and debt management. By analyzing concepts like internal rate of return , net present value , and asset compounding, students will develop the skills to evaluate farm business performance and make informed financial decisions for sustainable agricultural operations.

Theory

1. Introduction of farm planning and budgeting
2. Concepts and definition, function of farm management
3. Strategic farm management,
4. Tactical management, objectives of farm planning
5. Characteristics of a good farm plan
6. Components of farm planning
7. Steps in farm planning, partial and complete farm budgeting
8. Income statement and net worth statement; liabilities and business standing
9. Guiding principles a procedure in farm planning and budgeting
10. Equity; leverage and debt management in farm production

Recommended Texts

1. Casavant, K.L., C.L., Infager and D.E. Bridges. 1999. Agricultural Economics and Management. Prentice-hall, NJ, USA.
2. Kay, R.D., W.M. Edwards and P.A. Duffy. 2019. Farm Mnagement. 9th Ed. McGraw Hill Education. NY, USA.
3. Kerzner, H. 2017. Project Management: A Systems Approach to Planning, Scheduling and Controlling. 12th Ed. John Wiley & Sons, NJ, USA

.Suggested Reading

4. Mann, W.S. 1978. Farm Planning and Budgeting Technique. Khartoum UP, Sudan.
5. Olson, K. 2004. Farm Management: Principles and Strategies. Iowa State University Press, Iowa City, USA.

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ANSC-6131 **Poultry Farm Management** **3(2-1)**

This graduate level course specifically focuses on broiler, layer and breeder farming. This course covers all aspects of a commercial poultry farm. This course also gives some knowledge about the management of game birds. It is aimed at studying the husbandry of birds in different environment; poultry waste management, welfare of commercial poultry birds and trouble shooting of poultry farm to understand the causes of poor performance of birds. This course focuses on poultry farm practices including beak trimming, molting, medication and vaccination. This course also gives some knowledge about vices observed in poultry birds reared under intensified system and remedies to avoid abnormal behaviors in commercial birds. This course also elaborates different techniques that should be learnt to be a good manager of a commercial poultry farm. This course also tells about how a commercial poultry farm can be run successfully. Along with chicken this course also tells about the farming of quails, ducks, geese, peafowl, ostrich and turkeys.

Contents

Theory

1. Preparation for receiving day old chicks
2. Brooding, rearing and laying management of broilers, layer and breeders
3. Cage vs floor management
4. Management of quails, ducks, geese, peafowl, ostrich and turkeys
5. Feeding practices for broilers, layers and breeders; Light management
6. Causes of poor performance of layer and breeder flocks
7. Managerial practices to boost egg and meat production
8. Management of flock during hot and cold climates cannibalism; Vices and their remedies in poultry;Induced molting of spent layers and breeders
9. Trouble shooting in poultry farms; Poultry welfare
10. Poultry wastes disposal; Characteristics of an ideal poultry farm manager
11. Significance of record keeping; Use of computers in record keeping

Practical

1. Demonstration and handling of various types of brooders
2. Vaccination, medication, beak trimming and detoeing techniques
3. Remedies for different vices in poultry; Application of induced molting techniques
4. Preparation of birds for transportation; Computerized record keeping at farms
5. Feasibility report of 1000 broiler, layer and breeder flocks

Recommended Texts

1. P. V. Sreenivasaiah (2006). *Scientific poultry production*: International Book Distributing Company
2. Donald, D. B. and W.D. Weaver, Jr. (2007). *Commercial Chicken Meat and Egg Production.* India: Springer Pvt. Ltd.

Suggested Books

1. Donald, D.N & Waver, W.D. (2007). *Commercial Chicken Meat and Egg Production.* India: Springer Pvt. Ltd.
2. Haq, A. and Akhtar, M. (2004). *Poultry Farming.* H-9, Islamabad, Pakistan: Higher Education Commission of Pakistan.
3. Jull, M.A. (2003). *Successful Poultry Management.* Delhi, India: Bio-Tech Books

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AGRO-6914 **Forage and Fodder Production** **3(2-1)**

Forages and fodders are important agronomic crops that constitute important and basic component of animal feed. To develop skills regarding fodder production technology in graduate level students, a separate course was included in scheme of studies. This is very important course due to increasing demand of fodder for livestock throughout the year. The students will be taught about the different fodders their complete production technology and management. The knowledge about pasture management and factors affecting productivity of pasture are also discussed in detailed. It makes the students able to do different choices of fodder availability during different season throughout the year. Techniques of fodder preservation silage, hay, haylage will be practically demonstrated and students will be equipped all such techniques after completion of this course.

Contents

Theory

1 Importance and characteristics of forages and fodders
2 Critical period of fodder scarcity.
3 Factors influencing productivity and quality
4 Methods of increasing biomass production
5 Factors affecting chemical composition and nutritive value of forages
6 Preservation of fodders and forages (silage and hay making)
7 Toxicity due to chemicals and poisonous plants
8 Establishment of grasses and legumes in range lands
9 Constraints in fodder production and remedies.

Practical

1 Identification of forage, fodder crops and poisonous plants
2 Estimation of sprout density
3 Carrying capacity
4 Preparation of fodder calendar
5 Measurement of cover frequency
6 Preparation of silage and hay

Recommended Texts

1 Hedayetullah, M. & Zaman, P. (2019). *Fodder Crops of the World, Vol-I, Major fodder crops*, Florida: Apple Academic Press.
2 Balasubramaniyan, P.O. & Polanippan, S.P. (2001). Principles and Practices of Agronomy. New Delhi: Agrobios.

Suggested Readings

1 Advan, R.L. & Bezerra, L.R. (2018). *New Perspective in Forage Crops*, Croatia: Intech Open.
2 Singh, A.K. (2011). *Forage and Fodder*, New Delhi: Daya Publishing House.

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FRMT-6104 Circular Economy for Farm Management 3(3-0)

The "Circular Economy for Farm Management" course aims to teach students how to apply circular economy principles in agriculture, focusing on sustainable resource management, waste reduction, and closed-loop systems. Students will learn to optimize the reuse, recycling, and repurposing of materials to improve farm productivity, reduce costs, and minimize environmental impact. Upon completion, students will be able to implement circular economy strategies that enhance sustainability and resource efficiency in farm management.

Content

Theory

1. Overview of the circular economy and its principles.
2. Comparison of linear and circular economic models in agriculture.
3. Strategies for reducing waste and optimizing resource use on farms.
4. Role of renewable energy and bioenergy in circular farming systems.
5. Integration of crop and livestock systems for nutrient cycling.
6. Circular approaches to water management and irrigation.
7. Recycling of agricultural waste: composting, biochar, and biogas production.
8. Precision agriculture and smart technologies for resource efficiency.
9. Policy frameworks and incentives for implementing circular farm systems.
10. Case studies of successful circular economy practices in agriculture.

Recommended Books

1. Ellen MacArthur Foundation. (2013). *Towards the circular economy: Opportunities for the consumer goods sector*. Ellen MacArthur Foundation.
2. Pauli, G. (2010). *The blue economy: 10 years, 100 innovations, 100 million jobs*. Paradigm Publications.
3. Clark, J., & Winter, M. (2020). *Farmers and nature: Developing a circular economy*. Routledge.

Suggested Readings

1. Lüdeke-Freund, F., Gold, S., & Bocken, N. (2019). Business models for sustainability: Theoretical foundations and practices. Routledge.
2. Geissdoerfer, M., Pieroni, M. P. P., & Pigosso, D. C. A. (2021). Circular economy: Sustainable development and innovation. Routledge.

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SEMESTER-VI

AGRO-6903 **Agro-Technology of Major Crops** **3(2-1)**

This course is graduate level course of theories and practical of Agronomy. This course aims to elaborate the comprehensive study of food security issues which are being faced by the developing world and the consequences regarding its distribution throughout the world. It familiarizes the students about the history of major crops being cultivated in Pakistan. The advanced husbandry of the major crop cultivated in the country with special emphasis on critical production factors is also discussed in detail. The course also explains plant characteristics and phonological development of major crops. The improved sowing methods along with different management practices for major crops are also demonstration in the field. The students will be able to estimate the crop yields for major crops.

Contents

Theory

1. Significance and current scenario of major field crop production
2. Factors influencing cropping pattern
3. Origin, Importance, history, adaptation, distribution, morphology/botanical characteristics, and agro-technology of crops-wheat, rice, maize, cotton, sugarcane, rapeseed and mustard, gram & potato
4. Management, constraints and measures to optimize crop productivity
5. Modern techniques for crop improvement
6. Integration of principles of agronomy for improved crop productivity and food security.

Practical

1. Demonstration of improved sowing methods.
2. Raising and transplanting of rice nursery.
3. Delinting of cottonseed and evaluating its effect on seed germination and seedling establishment
4. Calibration of seed drills and sprayers; Practices for ensuring proper stand establishment of field crops
5. Observation regarding harvesting losses in field crops
6. Instructions and care of agricultural produce; Visits to progressive farms, research and extension farms.

Recommended Texts

1 George A. 2015. Principles of Crop Production: Theory, Techniques and Technology. Pearson Education, Inc., Boston, MA, USA

2 Hodgson, E.W., M.A. Licht and A.J. Sisson. 2020. Field Crop Production Handbook. Iowa State University Extension and Outreach, Iowa, USA.

Suggested Readings

3 Khan, S.R.A. 2001. Crop Management in Pakistan with Focus on Soil and Water. Directorate of Agricultural Information, Punjab. Lahore. Benkeblia N. (2018).*Climate Change and Crop Production: Foundations for Agroecosystem Resilience*, Florida USA: CRC Press, Taylor and Francis.

4 Martin, J.H., R.P. Waldren and D.L. Stamp. 2006. Principles of Field Crop Production, 4th Ed., The Macmillan Co., New York, USA.

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FMRT-6105 **Agricultural Pests and Weeds Management** **3(2-1)**

The course aims to equip students with the knowledge and skills to identify, manage, and control agricultural pests and weeds using sustainable and integrated approaches. Students will learn pest and weed biology, ecological interactions, and various control methods, including biological, mechanical, cultural, and chemical techniques. Upon completion, students will be able to implement effective Integrated Pest Management (IPM) and Integrated Weed Management (IWM) strategies to optimize crop production while minimizing environmental impact.

Theory:

1. Overview of agricultural pests, weeds, and their economic importance
2. Classification of pests (insects, rodents, fungi) and weeds (annuals, perennials)
3. Life cycles of major pests and weeds, and factors influencing their populations
4. Pest-host plant relationships and ecological factors in pest and weed growth
5. Principles of Integrated Pest Management (IPM) and Integrated Weed Management (IWM)
6. Biological, cultural, mechanical, and chemical control methods for pests and weeds
7. Pest-resistant crops, biotechnology, and natural predators in pest management
8. Herbicides: application methods, resistance, and safety protocols
9. Environmental impact of pesticides and health safety precautions
10. Major pests and weeds in staple and horticultural crops, including organic farming systems

Practical:

1. Identification of pests and weeds in the field and laboratory using identification keys
2. Surveying pest populations and monitoring pest control methods
3. Application of herbicides and mechanical methods for weed control
4. Data collection and analysis for pest and weed management decisions

Recommended Books

1. Pimentel, D. (Ed.). (1997). *Integrated pest management: Concepts, tactics, strategies, and case studies*. Wiley-Blackwell.
2. Lemerle, D., & Gill, G. S. (2002). *Principles of weed management*. Springer.
3. Raybould, J. M., & Thacker, J. R. M. (Eds.). (2005). *Agricultural pest management*. Blackwell Publishing.

Suggested readings

1. Taylor, S. G. R. D. C. M. (2003). *Weed ecology in natural and agricultural systems*. Cambridge University Press.
2. Thompson, J. H. T. S. (2004). *Pest control and management*. Springer.
3. Chambers, C. R. W. F., & Williams, R. M. W. (2010). *The pesticide manual*. 16th ed. British Crop Protection Council.

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FMRT-6106 **Agronomy of Fruit Production** **3(2-1)**

This course aims to equip students with a comprehensive understanding of fruit production, including the classification, characteristics, and significance of major fruit crops. Students will learn the principles of orchard planning, propagation techniques, and nutrient and irrigation management, along with methods for pruning, training, and pest control. By the end of the course, students will be able to establish and manage sustainable orchards, implement effective production practices, and evaluate the economic aspects related to fruit cultivation and post-harvest handling.

Contents

Theory:

1. Importance of fruit production in agriculture.
2. Climatic and soil requirements for fruit crops.
3. Classification and characteristics of major fruit crops.
4. Methods of propagation for fruit plants.
5. Principles of orchard planning and establishment.
6. Nutrient and irrigation management in orchards.
7. Pruning and training techniques for fruit trees.
8. Common pests, diseases, and their control in fruit crops.
9. Harvesting, post-harvest handling, and storage of fruits.
10. Economic and environmental aspects of fruit production.

Practical:

1. Identification of major fruit crops and their varieties.
2. Soil testing and site selection for orchards.
3. Demonstration of propagation techniques (e.g., grafting, budding).
4. Hands-on pruning and training of fruit trees.
5. Diagnosis and management of pests and diseases in orchards.
6. Observation and evaluation of nutrient and irrigation practices.

Recommended Texts

1. Hartmann, H. T., Kester, D. E., Davies, F. T., & Geneve, R. L. (2014). Plant propagation: Principles and practices (8th ed.). Prentice Hall.
2. Westwood, M. N. (2013). Temperate-zone pomology: Physiology and culture (3rd ed.). Timber Press.
3. Jackson, D. I., & Looney, N. E. (2016). Temperate and subtropical fruit production (3rd ed.). CABI Publishing.

Suggesting Readings

1. Singh, G. (2017). Fruit crops: Cultivation practices and economy. New India Publishing Agency.
2. Childers, N. F., & Morris, J. R. (2015). Modern fruit science: Orchard and small fruit culture (12th ed.). Horticultural Publications.

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AGRO-6917 **Principles of Weed Science** **3(2-1)**

The Principles of Weed Science is a graduate level course that consists of very basic principles and techniques of weed management in crops. The weeds are among most problematic enemies of crops that cause huge yield losses in crops and deteriorate the aesthetic and economic value of lands. This course aims to nurture students regarding principles of weed science. It focuses on a detailed introduction to weed science with special emphasis on weeds of Pakistan and their management strategies. At the end of this course the students will be able to identify the weeds problem and suggest an appropriate solution for managing the weeds. The course explicitly elaborate the issues related to chemical weed control like herbicide resistance and suggest measure to overcome these problems without decreasing yield of field crops.

Contents

Theory

1 Definition and importance of weeds.
2 Yield losses and harmful effects of weeds.
3 Classification and biology of weeds.
4 Weed-crop interference, Competition and allelopathic interactions.
5 Methods of weed management; preventive, cultural, mechanical, biological and chemical.
6 Weed control in major field crops.
7 Integrated weed management.
8 Herbicide resistance and tolerance against weeds and crops.
9 Technical information regarding current herbicides.
10 Mulching and soil solarization

Practical

1 Weed collection and identification
2 Demonstration of various hand tools& implements for weed control
3 Trials for testing the germination of different weeds and treatment for breaking their dormancy
4 Calibration and demonstration of sprayers for herbicide application
5 Survey into weed flora of different agro-ecological zones.

Recommended Texts

1 Zimdhal, R. L. (2018). Fundamental of Weed Science 5th Ed. New York: Elsevier, Academic Press.
2 Jabran, K. & Chauhan, B. (2018). *Non-Chemical Weed Control,* Oxford: Academic Press.

Suggested Readings

1 Korres, N.E., Burgos, N.R. and Stephen & Duke O. (2019).b*Weed Control: Sustainability, Hazards, and Risks in Cropping Systems Worldwide,* New York: CRC.
2 Tanveer, A. (2008). *Biology and Ecology of Weeds*, Islamabad: Higher Education Commission.
3 Tanveer, A. (2006). *Weeds and their control*, Islamabad: Higher Education Commission.

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ANSC-6116 **Management of Dairy Animals** **2(1-1)**

This is the course of under graduate level about management of dairy animals. Dairy is a universal agricultural production: people milk dairy animals in almost every country across the world, and up to one billion people live on dairy farms. It is a vital part of the global food system and it plays a key role in the sustainability of rural areas in particular. Dairy farming is a class of agriculture for long-term production of milk, which is processed (either on the farm or at a dairy plant, either of which may be called a dairy) for eventual sale of a dairy product. It is a well-known fact that the dairy industry actively contributes to the economies of a number of communities, regions and countries. An increasing demand worldwide is noticeably emerging at present, and the industry is globalizing, thus increasing the scope and intensity of the global dairy trade. However, the question of how and on what criteria we can objectively assess the economic benefits of the dairy sector still remains. The following course aims to summarize the different aspects of dairy economy.

Contents

Theory

1. Scope and importance of the dairy industry of Pakistan
2. characteristics of local, exotic and crossbred dairy animals
3. principles of profitable dairy production
4. buffalo and cow as major dairy animals, selection of dairy animals
5. establishing a dairy enterprise, raising dairy replacement stock
6. management of sire, pregnant and lactating animals
7. grazing management of dairy animals, significance of dry buffalo/cow therapy
8. thermal stress and buffalo/cow performance
9. feeding for economical milk production, dairy herd improvement associations
10. dairy system models, modern trends in dairy industry
11. buying and selling guide, prophylactic measures, common ailments.

Practical

1. Daily feeding management practices;
2. Care, handling and feeding of calves, Weaning practices
3. Use of score card for animal judging, Protecting animals from inclement weather
4. Mastitis screening tests; suckling, drenching, dipping, foot bath and spraying
5. Vaccination and preventive measures
6. Improved fodder and forage production, harvesting and feeding/grazing practices
7. Hay and silage making practices, Preparing feasibility reports
8. Use of computer for record keeping, Visit to livestock farms and shows.

Recommended Texts

1. Banerjee, G. C. (1998). *A textbook of Animal Husbandry*. New Delhi, India.: Oxord and IBH Publishing Co.
2. W.J. Miller (2012). *Dairy cattle feeding and nutrition*: Elsevier

Suggested books

1. Shah, S.I. (1994). *Animal Husbandry.* Islamabad, Pakistan: National Book Foundation.
2. Mackintosh, J.B. (1983). *Sheep Production in Pakistan*. Islamabad: PARC.

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FMRT-6107 **Vertical Farming Systems** **3 (2-1)**

The objective of the "Vertical Farming Systems" course is to provide students with a comprehensive understanding of vertical farming technologies, including the design, operation, and management of vertical farming systems using techniques such as hydroponics, aeroponics, and aquaponics. Students will gain knowledge of optimizing plant growth in controlled environments, focusing on space and resource efficiency. Upon completion, students will be equipped to implement sustainable urban agriculture practices, applying innovative farming methods to address food security challenges, maximize crop yield in limited spaces, and contribute to environmentally responsible farming solutions.

Theory Content

1. Introduction to vertical farming and its importance in modern agriculture.
2. Principles of hydroponics, aeroponics, aquaponics, and soil-based vertical systems.
3. Environmental control technologies: lighting systems, temperature, and humidity management.
4. Role of sensors, automation, and renewable energy in vertical farming.
5. Sustainability considerations: water recycling, energy efficiency, and carbon footprint reduction.
6. Economic feasibility and cost-benefit analysis of vertical farming.
7. Current challenges, opportunities, and emerging trends in vertical farming systems.

Practical Content

- Hands-on setup and management of hydroponic and aeroponic systems.
- Monitoring and adjusting environmental conditions for optimal plant growth.
- Measuring and managing pH and nutrient levels in water-based systems.
- Designing and creating a small-scale vertical farming setup for specific crops.
- Conducting growth performance evaluations of plants in different vertical farming setups.
- Field visits to observe operational vertical farming systems (optional).

Recommended Books

1. Despommier, D. (2010). *The vertical farm: Feeding the world in the 21st century*. Macmillan.
2. Kozai, T., Niu, G., & Takagaki, M. (2016). *Plant factory: An indoor vertical farming system for efficient quality food production*. Academic Press.
3. Resh, H. M. (2022). *Hydroponic food production: A definitive guidebook for the advanced home gardener and the commercial hydroponic grower* (8th ed.). CRC Press.

Suggested Readings

1. Touliatos, D., Dodd, I. C., & McAinsh, M. (2017). Vertical farming: Techniques, challenges, and innovations. Springer.
2. Grewal, H. S., Maheshwari, B., & Parks, S. E. (2018). Hydroponics for the home grower. CSIRO Publishing.
3. Giurgiu, M., & Simion, A. I. (2019). Smart agriculture technologies: Urban and vertical farming solutions. Elsevier.

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URCG-5111 **Translation of the Holy Quran - III** **Non-Credit**

Topic	Details
Semester/Level	In some discipline 5th semester and in some discipline 6th Semester/ BS (5th Semester intake) 1st / 2nd
Objectives	• To introduce ethics and highlight its importance, need and relevance for individual and collective life. • To illuminate the students with the Quranic norms of Morality i.e. truthfulness, patience, gratitude, modesty, forgiving, hospitality etc. • To familiarize the students with immoral values like falsify, arrogance, immodesty, extravagance, backbiting etc. • To inculcate ethical and moral values in our youth. • To develop a balanced dynamic and wholesome personality. • To introduce the students to Quranic Arabic grammar in practical manner.
Course Contents:	○ اخلاق (تعارف،ضرورت واہمیت ،اقسام،معنویت) اخلاق حسنہ : • برائی کو نیکی سے مٹانا • نیکی کے کاموں میں مسابقت • لوگوں کے درمیان صلح • عدل وانصاف • سچائی • ایثار • سلیم قلب • مہمان نوازی • لغویات سے اعراض • عاجزی و انکساری • نگاہ اور آوازکو پست رکھنا • چال میں میانہ روی • شرمگاہوں کی حفاظت • صبر • شکر • امور میں میانہ روی اخلاق سئیہ : • ظلم اور زیادتی • غرور و تکبر • نفسانی خواہشات کی پیروی • بدگمانی • جھوٹ • چغلی اور تہمت • تمسخر اور شیخی خوری • لہو و لعب • برے ناموں سے پکارنا • احسان جتانا اور تکلیف دینا • فضول خرچی اور حد سے بڑھنا • حسد اور تنگ دل • بے پردگی
Grammar:	• قرآنی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of Chapters and	▪ منتخب آیات مع ترجمہ وتجوید ▪ البقرہ (۱۱۲، ۲۳۵، ۸۳، ۱۸۲، ۱۷۲، ۱۵۲، ۱۷۲، ۵۲، ۱۵۳، ۱۷۷، ۲۵۰، ۱۲۵،

verse Numbers:	٢٢٢، ٢٧، ٧٧، ١٨٢، ١٣٨، ١٨٧، ١٠٩، ٢٦٣، ٢٦٣، ٢٦٢، ٢١٢، ٦٧، ٢٣١، ١٠، ٣٣، ١٢٣، ٢٥٨، ٢٧، ٧١، ٨٣، ٢٢٦، ١٩٥، ٧٦) ▪ آل عمران (١٥٣، ١٣، ٢٣، ١٨٥، ١٣٢، ١٣٨، ١٣٣، ١٣٥، ١٧، ٢٠٠، ١٢٥، ١٣٣، ١١٣، ١٠٣، ١٠٣، ٢٦، ٧٨، ١٣١، ١٣٧، ١٥٩) ▪ النساء (١٣٥، ٢٣، ٢٢، ١٠٨، ١٠٧، ١٠٥، ٥٣، ٢٠، ٢٧، ١٧٣، ٣٦، ٢٥، ٢٣، ٣٧، ٥٧، ٢٣) ▪ المائدة (٥٨، ٥٧، ٩٣، ١٣، ٦، ٣١، ١٩) ▪ النحل (١٢٦، ٩٠، ١٠٥، ١١٣، ٣٠، ١٢٦، ١٢٥) ▪ الرعد (٢٥، ٢٠، ٢٣، ٢٢، ٦) ▪ الاعراف (٣١، ٦٦، ٥١، ١٣٦، ٣٠، ٣، ٢٠، ١٣٣، ١٩٩، ٩٥، ٨١) ▪ القصص (٥٣، ٨٣) ▪ فصلت (٣٣) ▪ الانعام (٣٢، ٧٠، ٧٠، ١٣٠، ١٥٥، ١٦٠) ▪ النمل (٩٠، ٣٦) ▪ الحج (٣٠، ٥٨، ٦٠، ٨٨، ٧٧) ▪ الحجرات (٩، ١١، ٦، ١١، ٣، ١٢، ١٥، ١٠) ▪ الاحزاب (٢٣، ٥٠، ٥٨، ٥٨، ٥٢، ٥٥، ٥٩، ٣٥، ٢٣، ٣٥) ▪ الحشر (٩) ▪ طه (٧٢) ▪ الانعام (١٦٣، ١٣١، ١١٦، ١٥١، ٦٣، ١٢٧) ▪ ق (٣٣) ▪ الانفال (٢٧، ٣٦، ٦١) ▪ الفتح (١٥) ▪ يونس (١٠، ١٩، ١٢، ٦٦، ٢٢، ٢٢) ▪ الفرقان (٦٣، ٢١، ٦٧، ٦٣) ▪ النور (٢٣، ٦، ٣، ٣٠، ٣١، ٣٣، ٣٣، ٦١، ٣١، ٢٢) ▪ لقمان (٦، ٣٣، ١٩، ٣٢، ١٨) ▪ الاسرا ء(٣٧، ١١٠، ٥، ٣٧) ▪ المزمل (١٨) ▪ المدثر (٦، ٣) ▪ المدثر (٧٣) ▪ فاطر (٣٢) ▪ الفتح (٢٩) ▪ البلد (١٧) ▪ الزمر (٣، ١٠) ▪ الحجر (٨٥) ▪ النجم (٣١) ▪ الرحمٰن (٦٠) ▪ هود (٨، ١٠٢، ٣) ▪ الكهف (٢، ٥٦) ▪ الشورى (٣٧) ▪ غافر (٢٨، ٢٧) ▪ الحديد (٢٠، ٢٠) ▪ مريم (٥٩) ▪ النازعات (٣١) ▪ التوبہ (٦٥، ٦٣، ٧٧) ▪ الهمزه (١)

SEMESTER-VII

AGRO-6916 Agro Technology of Minor Field Crops and Medicinal Plants 3(1-2)

This course focuses on equipping students with the knowledge and understanding of the importance, origin, adaptation, distribution, and agro-technological practices of minor field crops and medicinal plants. Students will learn about sustainable cultivation methods, ecological adaptation, and the economic significance of these crops, fostering skills to enhance productivity and resource management. By the end of the course, students will be able to apply modern agro-technologies to optimize the production of various minor crops and medicinal plants in diverse agricultural systems.

Contents

Theory

1. Importance, origin, adaptation, distribution and agro-technolgy of crops- durum wheat, barley, cultivated oat, triticle and rye, soybean,rapes and mustard, gram, lentil, mashbean, mongbean, cowpea,pigeonpea, sweet potato, alfalfa, sorghum, pearl millet, and other millet, guar, fennel, fenugreek, linseed, groundnut, sesame, sugar beet.

Practical

Demonstration of improved sowing methods. Raising and transplanting of nursery, preparation and use of green and farm yard manure. Demonstration of harvesting and processing technology.

Recommended Texts

1 Advances in Agronomy, All volumes. Academic Press Inc., New York.

2 Ahmad, N. and G.R. Chaudhry. 1988. Irrigated Agriculture of Pakistan. Publisher, Shahzad Nazir, 61 B/2, Gulberg III, Lahore,Pakistan.

3 Arnon, I. 1992. Agriculture in dry lands: Principles and Practices. Elsevier, London.

Suggested Readings

1 Khan, S. R. A. 2001. Crop Management with focus on soil and water, Agr. Deptt. Govt. of Pb., Lahore,Pakistan.

2 Nazir, M.S. 1994. Crop Production. Ed. E.Bashir & R. Bantel. National Book Foundation, Islamabad,Pakistan

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AGRO-6919 **Conservation Agronomy** **3(2-1)**

The rainfed areas in the country are exposed to problem of soil erosion and water runoff. The soil and water conservation should be the main focus of all agronomic practices in rain fed agricultural conditions. This is graduate level course of theories and practical of Conservation Agronomy. This course aims to elaborate the comprehensive study of soil and water conservation issues which are being faced by the developing world. It also familiarizes the students about practices being used at farm level that help in agricultural resource conservation. The course explicitly relates practically soil and water conservation structures, effect of organic mulches, tillage practices for water conservation and measurement of soil erosion and run off.

Contents

Theory

1 Concept, importance and objectives of conservation.
2 Agronomic practices for resource conservation.
3 Tillage practices such as contouring, terracing, benching
4 Leveling, grading, watbandi
5 Zero tillage and minimum tillage
6 Chiseling, deep ploughing and planking
7 Species and cultivars selection.
8 Crop rotation and weed management.
9 Cover cropping; Strip cropping.
10 Fertilizers and green manuring.
11 Mulching and crop residue management.
12 Micro water-shed management under rainfed conditions.

Practical

1 Demonstration of soil water conservation structures.
2 Effect of different mulches.
3 Demonstration of tillage practices for soil and water conservation.
4 Measurement of run off and soil erosion.
5 Visit to different soil and water conservation centers/institutes.

Recommended Texts

1 Keesstra, S., Prima, S.D., Castellini, M. & Pirastru, M. (2019). *Soil Water Conservation Dynamics and Impact*. MDPI Books; Basel, Switzerland.
2 Hudson, N.W. (2004). Soil and water conservation in semi-arid areas. New Delhi: Scientific Publishers.

Suggested Readings

1 Kassam, A., Reicosky, D., Calegari, A., Friedrich, T., Hobbs, P., Chakraborty, D., Fayad, J. A., Landers, J., Araújo, A.G., Albertengo, J. & Goddard, T. (2019). *Advances in Conservation Agriculture-System and Science*, Cambridge: Burleigh Dodds Science Publishing Limited.
2 Maloo, S.R. (2002). *Sustainable Crop Production under Stress Environments*. Udaipur: Agro-tech Publishing Academy.

Khalil I.A & Jan, A. (2002).*Cropping Technology*. Islamabad: National Book Foundation.

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FRMT-6108 **Preparation of Research Project and Scientific Writing** **2(1-1)**

This is a graduate level course in Department of Agronomy. The aim of the course is to introduce the students about the research methodology and planning a research experiment in the field of agronomy. This course will introduce the method of collecting data and analyze the data and develop a skill to presentation in tabulated or graphical form. This course enhances the capability of students to write good scientific papers. The course emphasizes quality of writing and dissemination with a view to improve readability, maximize the contribution of the research done and improve the opportunities for publishing. It also concerns the quantity of scientific production by initially addressing the issue of increasing productivity through peer-guidance, best practice in scientific writing.

Contents

Theory

1 Concept of research,
2 Scientific method and experiment
3 Planning and execution of trials
4 Experimental designs and layout
5 Research trial observations
6 Collection, processing and analysis of data
7 Interpretation and summarization of results
8 Types of scientific writing.

Practical

1 Writing of research proposal
2 Layout of field experiments
3 Collection, tabulation and analysis of data
4 Presentation of data in tables, curves, histograms, etc.
5 Writing of scientific paper/report.

Recommended Texts

1 Heard S.B. (2016).*The Scientist's Guide to Writing: How to Write More Easily and Effectively Throughout Your Scientific Career*, New Jersey: Princeton University Press.
2 Garson, G.D. & Sarsfield, R. (2018). Research Designs. New York: Statistical Association Publishers.

Suggested Readings

1 Mack, C.A (2018).*How to Write a God Scientific Paper*, Bellingham: SPIE Publishers.
2 Khalil, S K. & Shah, P. (2007).*Scientific Writing and Presentation*, HEC Manaograph; Islamabad.
3 Martha, D. (2005).*Scientific Papers and Presentations*, San Deigo, California: Academic Press.

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AGRO-6912 **Farming Systems and Farm Records** **3(2-1)**

This course provides the knowledge of farm and farm related management techniques in form of theoretical and practical. This course delivers the basic knowledge in the field of farm management, maintenance farm records and farm layout. The students will have the knowledge of different farming systems and types of the farming. They will be able to prepare a layout of the farm which is a basic requirement for managing a farm on sustainable basis. The students will be practically trained through different techniques related to farm record managements like book keeping, double entry system, journal and ledger, cash book, trial balance, profit and loss account, bank accounts, discount, interest, appreciation and depreciation, preparation of profit and loss account and balance sheet.

Contents

Theory

1 Concept of farm management and maintenance of farm records.
2 Definition and fundamental principles of farming system and types of farming.
3 Layout of farms; Objective and advantages of keeping farm records.
4 Different systems of book keeping.
5 Principles of double entry system and their application.
6 Objective of journal and ledger; classification of accounts.
7 Drawing ledger, cash book, drawing up a trial balance.
8 Profit and loss account/income statement.
9 Bank accounts, bank cheques, discount, interest, bad debts.
10 Appreciation and depreciation of live and dead stock, land and buildings, plant and machinery.
11 Preparation of trading, profit and loss account and balance sheet.

Practical

1 Demonstration of farm layout
2 Training in maintenance of crop
3 Livestock and dead stock registers
4 Preparation of a balance sheet and different types of accounts
5 Calculation of appreciation and depreciation of different farm articles
6 Working out cost of production of major crops grown in irrigated and non-irrigated areas
7 Layout of farms and demonstration plots

Recommended Texts

1 Ghani, M.A. & Ahmad, E. (2000). *Principles of Accounting,* Lahore: Pak. Imperial Book Depot; Chock Urdu Bazar.
2 Shresther, A. (2003). *Cropping System*, New York: Food products Press, An imprint of the Haworth Press Inc.
3 Byerlee, D. and T. Hussain. 1992. Farming Systems of Pakistan. Vanguard Books, Lahore,Pakistan.

Suggested Readings

1 Moses, B. & Carson (2009).*Book Keeping and Accounts for Beginners*, Custom Books, India.
2 Wood, F. & Robinson, S. (2009).*Book Keeping and Accounts*, 7th Ed. Pennsylvania: Trans-Atlantic Publication Inc.
3 Sharma, A. N. and V. K. Sharma 1981. Farm Management. Prentice Hall of India (Pvt) Ltd., New Delhi,Pakistan.

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FRMT-6109 **Agrochemicals and Disease Management** **3(2-1)**

This course provides a comprehensive understanding of agrochemicals, their historical development, and current applications in disease management. Students will learn about the formulations, modes of action, and safe use of agrochemicals, with a focus on minimizing phytotoxicity, pollution, and health hazards. The course also covers legislation, advancements in agrochemical chemistries, and mechanisms of fungicide resistance. By the end of the course, students will be equipped to use agrochemicals judiciously, addressing plant disease challenges while ensuring environmental safety and public health.

CONTENTS

Theory

Past, development and current scenario of agrochemicals; formulations, application and phytotoxicity of agrochemicals; classification and modes of action of agrochemicals; pollution, hazards, legislation and public health; judicious use of agrochemicals; advancement in chemistries of agrochemicals; fungicide resistance and its mechanism.

Practical

Methods of application of agrochemicals; resistance monitoring; pathogen risk assessment; safety and health.

Recommended Texts

1. Brent, K.J. and Hollomon, D.W. 2007. Fungicide resistance in crop pathogens; How can it be managed? FRAC Monograph No. 1 (second, revised edition). ISBN 90-72398-07-6
2. Carisse, O. 2010. Fungicides. Intech Open. DOI:10.5772/555.
3. Dileep K. Singh (ed.). 2012. Toxicology: Agriculture and Environment: Pesticide Chemistry and Toxicology. In: Pesticide formulations and applications. Bentham books. ISBN:978-1-60805-531-9; pp. 104-111.

Suggested Readings

1. Ravichandra, N.G. 2018. Agrochemicals in plant disease management. Scientific Publishers. Jodhpur (Rajhistan), India. pp517. ISBN: 9789388043564.
2. Willoughby, OH, 1997. Farm Chemicals Handbook. Meister Publishing Company.

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FRMT-6110 Harvest and Handling of Crops 3(2-1)

this course aims to provide students with a thorough understanding of postharvest science and technology, emphasizing its importance and economic aspects in agriculture. Students will learn about maturity indices, and the proper methods for harvesting and handling fruits, vegetables, and flowers to minimize losses and maintain quality. Practical exposure to tools, equipment, and facilities like markets, cold storage, grading, and packaging units will enhance their skills in implementing effective postharvest practices. By the end of the course, students will be equipped to manage postharvest processes efficiently, ensuring the quality and marketability of horticultural crops.

CONTENTS

Theory

1. Introduction and importance of postharvest science and technology
2. Economic aspects of postharvest management
3. Maturity indices for horticultural crops
4. Harvest and handling of important fruits, vegetables and flowers.

Practical

1. Tools and equipment used in harvest and handling of horticultural crops
2. Visit to fruit and vegetable market, cold stores, fruits grading, packaging units and flower markets
3. Practices in harvesting and postharvest handling of different fruits, vegetables and flowers.

Recommended Texts

1. Armitage, A.M. and J.M. Laushman. 2003. Specialty Cut Flowers (2nd ed.). Timber Press, Portland, USA.
2. Kader, A.A. 2002. Postharvest Technology of Horticulture Crops. University of California. Agriculture and Natural Resources. California, USA.
3. Khan, A.S., and K. Ziaf (eds.,) 2017. Horticulture: Science and Technology, University of Agriculture, Faisalabad.
4. Kitinoja, L. and A.A. Kader. 2003. Small-Scale postharvest handling practices. A manual for Horticultural Crops (4th ed.). University of California, Davis, Postharvest Technology Research and Information Centre, USA.

Suggested Readings

1. Malik, M.N. 1994. Horticulture. National Book Foundation. Islamabad.
2. Wills, R., B. McGlasson, D. Graham and D. Joyce. 1998. Postharvest. An Introduction to the Physiology and Handling. Univ. New South Wales Press Ltd., Australia.

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ANSC-6134 Feed Evaluation, Formulation and Processing Technology 3(2-1)

This course tells about types, availability pattern and characteristics of feed resources of Pakistan. It also critically studies nutrient composition, utilization and significance of different feed stuffs used locally for feed manufacturing of livestock commercial poultry. This course gives an idea about effects of different feedstuffs on animal performance as well as use of non-conventional feed resources in animals. The main objectives of this course are to (a) Train students in determining the quality of raw feedstuffs and processed animal feeds. (b)Equip students with techniques involved in nutritive quality and feed efficiency estimation/determination. (c) Familiarize students with different processes involved in feed milling. (d) Train students in least cost feed formulation for various classes of livestock and poultry. After taking this course, students will be able to know that what to feed to animals and what feeding strategies should be used to economically fulfill the nutrient requirements of animals in commercial and semi-intensive system of livestock production. They will be able to determine the quality of animal feedstuffs. Students would be able to formulate balance diet and process feeds for different animal species.

Contents

Theory

1. Techniques for estimating nutritive value of feed stuffs and their validity
2. in vivo and laboratory techniques
3. factors affecting the nutritive value of feeds
4. measures of protein quality for monogastric; protein efficiency ratio, gross protein value; the essential amino acid index; protein evaluation systems for ruminants
5. natural toxicants of feeds and detoxification
6. feeding systems for livestock and poultry; raw feed material handling and storage
7. mixing processing and storage of finished; quality control in feed processing
8. forms of feeds and least cost ration formulation for ruminant livestock; equine, pets and poultry
9. Feed laws and regulations

Practical

1. Use of computer for least cost ration formulation for various classes of livestock and poultry; Availability pattern of feedstuffs in local market and their price structure; Manufacturing of wholesome feed
2. Demonstration of feeding trials for estimating feed efficiency; Visit of feed mills.

Recommended Texts

1. Miller. W.J. (2012). *Dairy cattle feeding and nutrition.* Academic Press Inc., NY.
2. Leeson. S. & Summers. J.D. (2008). *Commercial Poultry Nutrition*. Nottingham University Press, England.

Suggested Books

1. Ensminger M.E., Oldfield, J.E. & Heinemann, W.W. (1990). *Feeds and Nutrition Digest*. California, USA: TheEnsminger Publishing Co.
2. McEllihiney, R.R. (1994). *Feed Manufacturing Technology* IV. California, USA: American Feed Industry Association, Co.

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URCG-5111 **Translation of the Holy Quran - IV** **Non-Credit**

Topic	Details
Semester/Level	In some discipline 7th semester and in some discipline 8th Semester/ BS (5th Semester intake) 3rd / 4th
Objectives	• To familiarize the students with commandments of trade and inheritance mentioned in the Quranic text (with the help of Urdu translation). • Students • To introduce the students to scientific facts and miracles of the Holy Quran and Quranic stress on deep study of Allah's explored universe. • To motivate the students for reading and exploring the last Holy Book revealed by Almighty Allah. • Through memorization students will develop their relation with last revelation.
Course Contents:	○ تجارت اور وراثت: ● مال کی تقسیم ● نادان کا مال ● عوام الناس کا مال ● عورتوں کا مال ● یتیموں کا مال ● کفار کا مال ● جائز مال ● معاہدے ● ربن ● قرض ○ سائنسی حقائق: ● تخلیق کائنات ● اجرامِ فلکی ● شجر و حجر ● زمین و آسمان کے اسرار ● ہوائیں اور طوفان ● بہائم اور مویشی ● حشرات الارض ● پہاڑ اور سمندر
Grammar :	• قرانی عربی گرامر کے اصول اور انکے اطلاقات (متن قرآنی پر اطلاق سے توضیحات)
Details of Chapters and verse Numbers:	▪ منتخب آیات مع ترجمہ وتجوید ▪ البقرہ (٢٦١، ٢٢١٥، ٢٦٥، ٢١٩، ٢٦٣، ٢٤٥، ١٨، ٢٦٥، ١٧٧، ٢٦٥، ١٦، ٢٤٥، ٢٨٢، ٢٦٢، ٢٧٣، ٢٧١، ٨٣، ١٧٧، ٢١٥، ٢٧٦، ٢٧٨، ١٦، ٢٧، ٢٢٣، ٢٩، ٢٥٥، ١٦٣، ٢٦٦، ١٦٣، ١٦٣، ٥٠، ٦٠، ١٦٣، ٥٧، ٢١٠، ١٩، ٢٦، ٧١، ٩٢، ٩٣) ▪ آل عمران (١١٧، ١٣٣، ١٣٠، ١٩٠، ٢٧، ٥٩) ▪ النساء (٢٩، ٢، ٢٩، ١٦١) ▪ المائدہ (٨٩، ٩٥، ٧٥، ٦٩، ٦٠) ▪ التوبہ (٩٨، ٢٣، ٦٩، ٢٣، ٢٣، ٦٠، ٣) ▪ الاعراف (١٧٢، ١٨٥، ٥٧، ٥٨، ١٦٣، ١٦٣، ١٦٠، ٣٠، ١٣٣، ١٧٦، ١٦٦) ▪ الرعد (١٧، ٣) ▪ الطور (٣٣) ▪ الانعام (٥٩، ٦٣، ١٣١، ١٣٦، ٣٨) ▪ الانفال (٢٨، ٣٦، ٣١) ▪ الکہف (٥١، ١٠٩، ٣٧، ٣٢، ٣٥، ١٧، ٣٥) ▪ الجاثیہ (٥)

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- فاطر (٢٧، ١٢، ١٣)
- العنكبوت (٢٠، ٦٣، ٣١)
- الروم (٥٠)
- الاسراء (٧٠، ٩٩)
- الرعد (٢)
- السبا(١٠، ٣، ٢٢)
- يونس (٨٨، ١٠١، ٢٣، ٢٣، ٥، ٢٢)
- يوسف (٩٣، ١٣)
- الفرقان (٦٢، ٥٣)
- لقمان (٢٩، ١٦)
- طه (١١٣، ٥٣)
- النحل (٧٥، ١١، ٦١، ٣٩، ٧٩، ٦٨، ٦٨ ، ١١٥، ٨، ٨)
- النمل (٦٣، ٦٣، ٨٨، ٦٠، ٨٢، ١٦، ١٧ ، ١٨)
- السجده (٢٧)
- الحديد (٦)
- هود (٣٣، ٦)
- يسين (٣٧، ٣١)
- الروم (٣٩، ٣٩، ٥٠، ١٩، ٢٣، ٣٦)
- فصلت (٣٩، ٣٩)
- الحج (٦١، ٦٥، ٢٢، ٧٣)
- الحجر (١٩، ٢٢)
- الانبياء (٣١، ٣٠، ٣٧)
- الزاريات (٣٧)
- الزلزله (١)
- القصص (٧٦، ٧٩، ٨٠، ٨١، ٨٢)
- النور (٣٧، ٢٢، ٢٢، ٣٠، ٣٥، ٣٣)
- الجمعه (١١، ٦٢، ١٠، ١١، ٥)
- القمر (٧)
- الواقعه (٦٩)
- الفاطر (٢٠، ١٣)
- الملک (١٩)
- الصف (١٠)
- الجن (١٣)
- الشورىٰ (٢٨)
- الزخرف (١١)
- الفيل (١)

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SEMESTER-VIII

FRMT-6111 **Research project / Internship** **3(0-3)**

Internship opportunities can provide students with unique exposure to research in other environments, including private industries, federal agencies, other countries, or other universities. Because of their value to the graduate student experience, the Department of Agronomy offers this course. It is intended to apprise students of the basics of how to design and conduct research, data analysis as well as technical report writing and presentation. Further, it covers a wide spectrum of experiments designed for students at undergraduate level. The experiments are selected to provide insight into the basic principles and techniques of Agronomy. At the end of the semester, a study tour is arranged of provincial and federal research institutes to acquaint the students with recent research activities going on there. Pesticide companies' visits are also arranged time to time for this course during the semester. The core objective of this course is to train the students in such a way that at the completion of this course students may design their future research proposals.

Course Contents

1. Proposal development, on spot field training
2. Report writing and project presentation. (Format as per thesis manual of the university concerned).

Recommended Texts

1. Ghafoor, A. (2016). *Manual for synopsis and thesis preparation*. Faisalabad, University of Agriculture Press.
2. Relevant latest literature on target issues.

Suggested Readings

1. Reviews, research articles
2. Illustrated Manuals, Compendiums
3. Pocket books

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FRMT-6112 **Capstone Project** **3(0-3)**

A capstone project is typically a final project that allows students to showcase the knowledge and skills they have gained throughout their academic program and apply them to real-world problems and issues.

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