**DEPARTMENT OF AGRONOMY**
**Faculty of Agricultural Sciences**
**University of the Punjab, Lahore**

# Course Outline

| **Programme** | B. Sc. (Hons.) Agriculture (Agronomy) | **Course Code** | **AGR-411** | **Credit Hours** | 3 (2-1) |
|---|---|---|---|---|---|
| **Course Title** | **FORAGE AND FODDER PRODUCTION** | | | | |

## Course Introduction

This course provides a comprehensive overview of forage and fodder production, highlighting its importance in sustainable agriculture and livestock management. Students will learn about the terminology and taxonomy of various forage and fodder crops, with a focus on the current status and future prospects of forage production in Pakistan.

## Learning Outcomes

On the completion of the course, the students will:

1. Have proficiency in agro techniques for producing legume and non-legume forages and fodders focusing on sustainable practices
2. Develop skills in improving forage quality, and preserving fodder through hay and silage making, ensuring high-quality feed for livestock year-round.
3. Have Enhanced Knowledge of Rangeland and Pasture Management

| **Course Content** | | **Assignments/Readings** |
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| **Week 1** | **Theory**<br>**Unit-I**<br>1.1 Introduction to Forages and Fodders<br>1.1.1 Importance of forages and fodders in agriculture and livestock<br>1.1.2 Overview of forage and fodder production | Chapter 1<br>Forages and Fodders<br>(Singh et al.) |
| **Week 2** | **Unit-II**<br>2.1 Terminology and Taxonomy of Forage and Fodder Crops<br>2.1.1 Key terms related to forages and fodders<br>2.1.2 Classification and taxonomy of common forage and fodder crops | Chapter 8<br>Forages and Fodders<br>(Singh et al.) |

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| **Week 3** | **Unit-III**<br>3.1 Forage Production in Pakistan: Current Status<br>3.1.1 Overview of current forage production practices in Pakistan<br>3.1.2 Analysis of existing challenges and opportunities | Forage and Fodder Production in Pakistan (Ullah and Sharif)<br>Internet source |
| **Week 4** | **Unit-IV**<br>4.1 Forage Production in Pakistan: Future Scenario<br>4.1.1 Future prospects and potential advancements in forage production<br>4.1.2 Strategic planning for sustainable forage production | Forage and Fodder Production in Pakistan (Ullah and Sharif)<br>Internet source |
| **Week 5** | **Unit-V**<br>5.1 Agro Techniques for Legume Forages<br>5.1.1 Cultivation practices for legume forage crops<br>5.1.2 Best practices for maximizing yield and quality | Chapter 3<br>Principles of Field Crop Production (Martin et al.)<br>Forage legumes (Singh et al.) |
| **Week 6** | **Unit-VI**<br>6.1 Agro Techniques for Non-Legume Forages<br>6.1.1 Cultivation practices for non-legume forage crops<br>6.1.2 Best practices for maximizing yield and quality | Principles of Field Crop Production (Martin et al.)<br>Cropping Technology (Khalil, I.A and A. Jan) |
| **Week 7** | **Unit-VII**<br>7.1 Sustainable Forage Production<br>7.1.1 Sustainable agricultural practices for forage production<br>7.1.2 Integration of sustainable techniques into forage farming | Forage Crop Production and Conservation (Mukherjee, A.K. and S.Maiti) |
| **Week 8** | **Unit-VIII**<br>8.1 Rangeland Status and Productivity<br>8.1.1 Current status of rangelands in Pakistan<br>8.1.2 Strategies for improving rangeland productivity | Internet source |
| **Week 9** | **MID TERM EXAM** | |

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| **Week 10** | **Unit-IX**<br>9.1 Increasing Productivity of Pastures and Rangelands<br>9.1.1 Methods to enhance pasture and rangeland productivity<br>9.1.2 Role of pasture management in livestock nutrition | Chapter 44<br>Forages: The Science of Grassland Agriculture, 7th Edition<br>(Kenneth J. Moore et al.)<br>Internet source |
| **Week 11** | **Unit-X**<br>10.1 Seed Production of Forages<br>10.1.1 Techniques for producing high-quality forage seeds<br>10.1.2 Importance of seed quality in forage crop success | Chapter 32<br>Forages: The Science of Grassland Agriculture, 7th Edition<br>(Kenneth J. Moore et al.)<br>Principles of Field Crop Production (Martin et al.)<br>Internet sources |
| **Week 12** | **Unit-XI**<br>11.1 Nutrient Management in Forages and Fodders<br>11.1.1 Essential nutrients for forage and fodder crops<br>11.1.2 Fertilization practices for optimal nutrient management | Chapter 11<br>Forages: The Science of Grassland Agriculture, 7th Edition<br>(Kenneth J. Moore et al.)<br>Internet source |
| **Week 13** | **Unit-XII**<br>12.1 Forage Quality: Status and Improvement<br>12.1.1 Assessment of current forage quality standards<br>12.1.2 Techniques to improve the nutritional quality of forages | Forage Quality, Evaluation, and Utilization (G. Fahey) |
| **Week 14** | **Unit-XIII**<br>13.1 Fodder/Forage Production Constraints and Remedies<br>13.1.1 Common constraints in forage and fodder production<br>13.1.2 Solutions and remedies to overcome these challenges | Principles of Field Crop Production (Martin et al.)<br>Cropping Technology (Khalil, I.A and A. Jan)<br>Internet sources |
| **Week 15** | **Unit-XIV**<br>14.1 Fodder Preservation Techniques (Hay and Silage)<br>14.1.1 Introduction to hay and silage making<br>14.1.2 Best practices for preserving fodder quality through hay and silage | Chapter 41, 42<br>Forages: The Science of Grassland Agriculture, 7th Edition<br>(Kenneth J. Moore et al.)<br>Internet source |

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| **Week 16** | **Unit-XV**<br>15.1 Fodder Research Studies in Pakistan<br>15.1.1 Review of recent research studies on fodder production<br>15.1.2 Implications of research findings for practical applications | Forage and Fodder Production in Pakistan (Ullah and Sharif)<br>Internet source |
| **Week 17** | **Unit-XVI**<br>16.1 Integration and Practical Applications<br>16.1.1 Application of theoretical knowledge to practical forage and fodder production<br>16.1.2 Case studies and real-world examples<br>16.1.3 Review and assessment preparation | Internet source |
| | **Practical Course Contents**<br>5. Identification of fodder/forage crops and seed<br>6. Estimation of sprout density and plant population;<br>7. Silage and hay making practices<br>8. Preparation of fodder calendar<br>9. Determination of forage quality parameters<br>10. Visits of university farms. | |
| **Week 18** | **FINAL EXAM** | |

**Textbooks and Reading Material**


1. Dovrat, A. 1993. Irrigated Forage Production. Elsevier Scientific Publishers, The Netherlands.
2. Khalil, I.A and A. Jan. 2006. Cropping Technology. National book foundation, Islamabad, Pakistan.
3. Mukherjee, A.K. and S.Maiti.2009. Forage Crop Production and Conservation. Kalyani publishers, New Delhi, India.
4. Martin, J.H., R.P., Waldern and D.L. Stamp.2006. Principles of Field Crop Production. 4th ed. Pearson Prentice Hall, Ohio, USA.
5. Singh, A.K., M.A. Khan, N. Subash and K.M. Singh. 2011. Forages and Fodders. Daya Publishing House, Delhi, India.
6. Singh, J.V., B.S. Chhilar, B.D. Yadav and U.N. Joshi. 2010. Forage Legumes. Scientific Publishers, Jodhpur, India.
7. Barnes, R. F., Nelson, C. J., Moore, K. J., & Collins, M. 2007. Forages: The Science of Grassland Agriculture, volume II. 7th ed. Wiley Blackwell, New Jersey, USA.


**Teaching Learning Strategies**

1. Lectures
2. Class Discussions

3. Presentations
4. Quiz
5. Assignments

**Assignments: Types and Number with Calendar**

1. Written Assignments
2. Presentations

**Assessment**

| Sr. No. | Elements | Weightage | Details |
|---|---|---|---|
| 1. | Midterm Assessment | 35% | Written Assessment at the mid-point of the semester. |
| 2. | Formative Assessment | 25% | Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc. |
| 3. | Final Assessment | 40% | Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc. |