Name of the Programme: M. Sc (Botany)
Course Code: BOT-514
Title of the Course: Lab in Plant Molecular Biology and Genetic Engineering
Number of Credits: 2 (60 hours)
Effective from AY: 2022-2023

Prerequisites for the course:	Should have studied B. Sc. Botany. It is assumed that students have a basic knowledge of biochemistry, molecular biology and instrumental techniques at UG level.	
Objective(s):	To learn and understand various methods, techniques and hands on experiments with techniques concerning study of plant molecular biology and genetic engineering. This course is designed to introduce students to both the principles and the applications of molecular recombinant DNA technology to plants and microbial organisms. It describes the use of genetically engineered products to solve agriculture and environmental problems for human welfare.	
Content:	1. Preparation of media and other requirements, sterilized glassware etc. 2. Isolation and purification of genomic DNA from plant materials. 3. Isolation and purification of RNA from plants. 4. Culture of plasmid and maintenance of culture. 5. Isolation of plasmid DNA. 6. Quantitative estimation of genomic DNA and RNA using spectrophotometer. 7. Agarose gel electrophoresis of genomic DNA and RNA and detection using gel documentation system. 8. Digestions of DNA by restriction enzymes and size fractionation of fragments. 9. Ligation of digested fragments. 10. Primer designing. 11. cDNA formation using reverse transcriptase. 12. RT-PCR quantitation of selected gene(s) using SYBRG. 13. Use of software for quantitation of gene and compare the expression level. 14. Southern Blotting/Northern Blotting/Western Blotting (any one) 15. Creating a transformant using commercial construct. 16. 16 or 18s rRNA analysis. 17. Leaf disc transformation using Agrobacterium, establishment of transgenic plants and GUS staining of GFP viewing. 18. Amplification of genomic DNA using ISSR/ RAPD random primers in PCR and agarose gel electrophoresis and detect the banding patterns under gel documentation system and analysis of bands to understand genetic variation in plants. ***Only 60 hours for any of the above practicals will be conducted depending on availability of material, chemicals, equipments, etc.***	**2 hours** **4 hours** **4 hours** **2 hours** **4 hours** **2 hours** **4 hours** **2 hours** **2 hours** **2 hours** **4 hours** **8 hours** **2 hours** **4 hours** **4 hours** **4 hours** **4 hours**

Pedagogy:	Hands on practicals.	
References/ Readings:	**Brown T. A**. (2007). Genomes. Third Edition. Garland Science Publishing, New York. U.S.A. **Burton E. Tropp.** (2012). Molecular Biology. Fourth Edition. Jones and Bartlett India Pvt. Ltd, New Delhi. **David Freifelder.** (1990). Molecular Biology. Second Edition. Narosa Publishing House, New Delhi. **Dodds J.H.** (1985) Plant Genetic Engineering. Cambridge University Press. **Gloria Coruzzi.** (1994). Plant Molecular Biology - Genetic Analysis of Plant Development and Metabolism. Springer-Verlag, New York, London. **Grierson D & S. Covey.** (1984). Plant Molecular Biology. Panima Educational Agency, New Delhi. **Henry R. J.** (2005). Practical Applications of Plant Molecular Biology. Chapman & Hall, London, UK. **Kurnaz I.A.** (2015) Techniques in Genetic Engineering. CRC Press. **James D.W., Tania A.B., Stephen P.B., Alexander G., Michael L. & Richard L. (**2008). Molecular Biology of Gene. Sixth M.Sc Syllabus - 2018 Core 29 Edition. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York. U.S.A. **Lewin Benjamin.** (2008). GENES IX. Jones and Bartlett Publishers, London, UK. **Mary A. Schuler & Raymond E. Zielinski**. (2005). Methods in Plant Molecular Biology. Academic Press, USA. **Neal Stewart J.C.** (2008) Plant Biotech and genetics: Principle, techniques and applications. Wikley jones and Sons, Canada **Primrose, S.B. & R.M. Twyman.** (2009). Principles of Gene Manipulation and Genomics. Seventh Edition. Blackwell Publishing, U.S.A. **Shaw, C.H.** (1988). Plant Molecular Biology, Practical Approach. IRL Press, Oxford, Washington DC. **Tewari, K.K. & G.S. Singhal.** (1997). Plant Molecular Biology and Biotechnology. Narosa Publishing House, New Delhi. **Vennison, D.C.S.** (2009). Laboratory manual for genetic engineering. PHI Learning Pvt. Ltd..	
Learning Outcomes:	After completing this course student should be able to recognize the foundations of modern biotechnology and explain the principles that form the basis for recombinant DNA technology and be able to carry out R & D work or work in quality control laboratory on molecular biology and recombinant DNA technologies such as vector construction, cloning and gene expression etc.	

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