



KANNUR UNIVERSITY
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(Abstract)

Scheme and Syllabus of DSC Courses offered by the Department of Wood Science and Technology, Mangattuparamba Campus for other FYIM Programmes in University Departments- Approved and Implemented w e f 2025 admission - Orders issued.

ACADEMIC C SECTION

ACAD/ACAD C1/11114/2025

Dated: 09.10.2025

Read:-1. U O No. Acad C3/22488/2023 dtd 15.03.2024

2. Minutes of the Department Council Meeting of the Department of Wood Science and Technology.
3. E mail dated 03.07.2025 from Hod Dept. of Wood Science and Technology
4. E mail dated 06.08.2025 from the Dean, Faculty of Science.
5. Minutes of the meeting of Standing Committee of Academic Council held on 08.08.2025
6. E mail dated 18.08.2025 from the Hod, Dept. of Wood Science and Technology
7. Orders of the Vice Chancellor, in the file of even no dated 01.09.2025

ORDER

1. As per the paper read (1) above, the Regulations for the Five Year Integrated Master's Programme (FYIMP) in University Teaching Departments/schools were implemented w.e.f the academic year 2024-25.
2. As per paper read (2) above the Department Council, Department of Wood Science and Technology decided to offer DSC courses for other FYIM Programmes in University Departments w e f 2025 admission.
3. Subsequently, the Head, Department of Wood Science and Technology submitted the syllabus of DSC courses offered by the Department of Wood Science and Technology for other FYIM Programmes in University Departments for approval along with the Minutes of the meeting of the Department Council vide the paper read (3) above.
4. The syllabus was forwarded to the Dean, Faculty of Science for verification. The Dean , Faculty of Science, recommended to proceed with the syllabus vide the paper read (4) above.
5. The Standing Committee of Academic Council, vide the paper read (5) above recommended to refer back the Syllabus to the Department Council as the syllabus mentioned minor courses instead of DSC Course.
6. Subsequently, the matter was intimated to the Head, Department of Wood Science and Technology and the Head corrected the word 'Minor' to 'DSC' in the syllabus and submitted for approval, vide the paper read (6).
7. The Vice Chancellor, after considering the matter, and in exercise of the powers of the Academic Council conferred under Section 11(1) Chapter III of Kannur University Act, 1996 and all other enabling provisions read together with, approved the Scheme and syllabus of DSC courses offered by the Department of Wood Science and Technology , Mangattuparamba Campus for other



FYIM Programmes in University Departments w.e.f 2025 admission.

8. The Scheme and syllabus of DSC courses offered by the Department of Wood Science and Technology, Mangattuparamba Campus for other FYIM Programmes in University Departments w.e.f 2025 admissions under Kannur University is appended with this U.O. and uploaded in the University website.

Orders are issued accordingly.

Sd/-

Bindu K P G

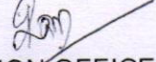
DEPUTY REGISTRAR (ACADEMIC)

For REGISTRAR

To: 1. The Head, Dept. Wood Science and Technology, Mangattuparamba Campus
2. Nodal Officer, FYIMP

Copy To: 1. PS to VC, PA to R, PA to CE
2. JR (Exam)
3. DR / AR (Academic)
3. EP IV/EG I/EXC I (Exam)
4. IT Cell (to publish in the website)
5. Computer Programmer
6. SF/DF/FC

Forwarded / By Order


SECTION OFFICER



KU01DSCWST101 FORESTRY AND DENDROLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100	KU01DSCWST101	4	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	1	1	50	50	100	2 hours

COURSE DESCRIPTION

This course provides a basic understanding of forests and trees highlighting their tangible and intangible benefits to environment. It introduces the principles of forestry, dendrology and sustainable forest management. The basics of tree identification, forestry certification systems, and the diagnostic features of different families of important trees will also be introduced

COURSE OBJECTIVES

- To study the basic principles of sustainable forest management.
- To explore the possibilities of people participation in forestry
- To acquire knowledge on the basic identification methods used in tree identification.
- To understand about the characteristics of important timber producing families.
- To give an overview about the importance of plantation forestry and various silvicultural operations.

COURSE OUTCOME

On completion of this course the student will be able to:

CO No	Expected Outcome	Learning Domains
C01	Explain the different types of forest and various branches of forestry	Cognitive
C02	Describe the importance of forest plantation, social forestry, and trees outside forest	Cognitive
C03	Apply the Silvicultural techniques for sustainable forestry	Cognitive & Psychomotor
C04	Identify the common timber species using morphological characteristics	Psychomotor
C05	Explain various forest certifications involved in sustainable forest management	Cognitive

Mapping of COs to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓

COURSE CONTENTS

Module 1 Forests

Forests – definition, classification and brief description of forest types. Forestry – its scope and branches. Forest health and its management. Sustainable forest management. Social forestry and its role in timber production. Participatory forest management. Agroforestry Systems

Module 2 Silviculture and Forest plantations

Silviculture - definition, scope and objects. Forest plantations - different types. Rotation - definition and types. Site and species selection, planting, maintenance and other silvicultural operations. High density short rotation plantations, pulpwood plantations and energy plantations. Trees outside forests (TOF). Forest plantations and CDM. Forest certification.

Module 3 Dendrology

Taxonomy and its relevance to wood science. Taxonomic identification tools: bark, stem, leaf, flower, fruit, seed. Plant nomenclature: International Code of Botanical Nomenclature and its rules. Systems of classification (Natural, artificial and phylogenetic, brief description of Bentham and Hooker system of classification).

Module 4 Tree families

Systematic positions and diagnostic features of important trees of 10 major timber producing families (Leguminosae, Dipterocarpaceae, Lythraceae, Meliaceae, Combretaceae, Pinaceae, Guttiferae, Myrtaceae, Santalaceae, Moraceae)

Module 5 (Teacher specific)

Group discussions, field activities and seminars related to Emerging technologies in forestry and Dendrology.

Suggested Readings

1. Tim Peck (2001): The International Timber Trade, Woodhead Publishing Limited, England.
2. Bhattacharyya *et.al.* (2007): A Text Book Of Botany, New Central Book Agency Private Ltd., Kolkata, India
3. Shukla, R.S. & Chandel, P.S.(2008): Ecology and Utility of Plants, S.Chand& Company Ltd, New Delhi
4. Nautiyal, S. & Kaul, K. (2003): Non Timber Forest Products of India (Ed.), Jyothi Publishers and Distributors, Dehradun, India.
5. SopheHigman.*et.al.* (2006): The Sustainable Forestry Hand Book(2nd edition), Earthscan Publications Ltd, London.
6. George H.M Lawrence, (1951): Taxonomy of Vascular Plants, Scientific Publishers, India.
7. Garfitt, J.E. (1995): Natural Management of Wood Continuous Cover Forestry, Research Studies Press Ltd, England.
8. Yadav, Manmohan. (2016). Handbook on Forest Certification. TERI Press
9. Sagwal, S.S. (2006): A Text book of Silviculture, Kalyani Publishers, India
10. Negi, S.S. (2000): Indian Trees and their Silviculture - Legumes,BishensinghMahendrapal Singh (publication),Dehradun,India.
11. Khanna, L.S.1989. Principles and Practice of Silviculture. Khanna Bandhu, Dehra Dun. 473 p Negi,
12. John G. Robles and Charlotte A. Savage (2012). Forest Certification and Sustainable Management: Programs, Standards and Techniques. Nova Science Publishers
13. Manikandan, K and Prabhu S IFS (2018) Indian forestry A breakthrough approach to Forest service, Jain Brothers Publishers
14. Negi S.S., Agroforestry Handbook. International Book distributors, Dehradun

TEACHING LEARNING STRATEGIES: Classroom activities / Lab activities / Field Activities

MODE OF TRANSACTION: Online/Offline

ASSESSMENT RUBRICS

Evaluation Type	Marks
End Semester Examination	50
Continuous Evaluation	50
Total	100
Continuous Evaluation	
Seminars	20
Test papers	20
Assignment	10

SAMPLE QUESTIONS TO TEST OUTCOME

1. Differentiate between linear strip plantation and shelter belts
2. Discuss the major aim of Clean development Mechanism
3. Using the information you have learned explains the role of social forestry in meeting timber requirements of rural people?
4. Examine the characteristics of the family Pinaceae and Combretaceae?

KU02DSCWST102 FOREST PRODUCTS AND THE CIRCULAR BIO ECONOMY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU02DSCWST102	4	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	1	1	50	50	100	2 hours

COURSE DESCRIPTION

This course provides a brief understanding of the concept of circular bioeconomy. It also explores the possibilities of replacing the linear economic model with a circular one through the sustainable use of resources, waste minimization, and the critical role of renewable biological resources. The utilization of forest-based products, innovative use of residues, substitution of fossil-based materials, and climate change mitigation through sustainable forest management will also be detailed. The course further examines forest biomass, bioenergy, and certification systems that ensure the responsible use of forest resources.

COURSE OBJECTIVES

- To understand the principles and the circular economy with relevance to forestry.
- To explore the role of renewable forest resources in a circular bioeconomy.
- To examine the innovation in forest product utilization for sustainability.
- To understand the role of forest management in climate change mitigation
- To acquire knowledge on forest product certification for sustainability

COURSE OUTCOME

On completion of this course the student will be able to:

CO No	Expected Outcome	Learning Domains
C01	Explain the importance of replacing linear economy with circular economy	Cognitive
C02	Describe role of forest products in bioeconomy	Cognitive

C03	Apply the innovative technologies for developing sustainable forest products	Cognitive & Psychomotor
C04	Identify the role of forest products in climate change mitigation and circular economy	Psychomotor
C05	Explain various possibilities of value addition in forest waste management and utilization	Cognitive

Mapping of COs to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓

Module 1 Introduction to Circular Bioeconomy

Introduction to Circular Economy, Development of Concept of Circular Economy, Replacing Linear economy by Circular Economy, Characteristics of Circular Economy, Waste Management in context of Circular Economy, Role of renewable biological resources in sustainability

Module 2 Forest Products in the Circular bio economy

The role of forest products in the bio economy. Circularity Concepts in Forest-Based Industries, Wood based material for circular bioeconomy, Role of forest products in carbon storage and GHG emission reduction, Circular Strategies in Forestry Waste Management, Innovation in Forest Product Utilization

Module 3 Substitution Opportunities and Sustainable Development

Substitution of fossil-based and non-renewable materials. Greenhouse gas profiles of wood with competing non-wood materials in construction and packaging; barriers to material substitution. Upgradation of wood residues. Energy from wood – briquetting, wood gasification- production of bioethanol from lignocellulosics.

Module 4 Forest biomass for climate change mitigation

Forest biomass availability, Carbon sequestration and storage in the forests, Sustainable forest management and climate change mitigation, Cascading use of forest biomass, Role of Forest-based sectors in climate change mitigation. Forest Product certification

Module 5 (Teacher specific)

Group discussions, field activities and seminars related to Emerging technologies in Sustainable forest product utilization

Suggested Readings

1. Contipelli, E. (2024). Introduction to circular economy. Remote Connections for Sustainability.
2. Guman, O., & Wegner-Kozlova, E. (2020). Waste management based on circular economy principles. E3S Web of Conferences, 177, 04014. <https://doi.org/10.1051/e3sconf/202017704014>
3. Van Ewijk, S., & Stegemann, J. (2023). An introduction to waste management and circular economy. UCL Press University College London.
4. Aggestam, F., & Wollnik, R. (2022). *Circularity concepts in forest-based industries*. United Nations Economic Commission for Europe.
5. Larsson, T-B & Barbati, Anna & Bauhus, Jürgen & Van Brusselen, Jo & Lindner, Marcus & Marchetti, Marco & Petriccione, Bruno & Petersson, Hans. (2007). The Role of Forests in Carbon Cycle, Sequestration, and Storage. IUFRO-Newsletter. 5.
6. Hassegawa, M., Van Brusselen, J., Cramm, M., & Verkerk, P. J. (2022). Wood-Based Products in the Circular Bioeconomy: Status and Opportunities towards Environmental Sustainability. *Land*, 11(12), 2131. <https://doi.org/10.3390/land11122131>
7. Hassegawa, Mariana & Karlberg, Anna & Hertzberg, Magnus & Verkerk, Hans. (2022). Innovative forest products in the circular bioeconomy. Open Research Europe. 2. 19. 10.12688/openreseurope.14413.2.
8. Reid, H., Huq, S., Inkinen, A., J., Macqueen, D., Mayers, J., Murray, L. and Tipper, R. (2004). Using wood products to mitigate climate change: a review of evidence and key issues for sustainable development. IIED, London.
9. Roman, Kamil & Grzegorzewska, Emilia. (2024). Biomass Briquetting Technology for Sustainable Energy Solutions: Innovations in Forest Biomass Utilization. *Energies*. 17. 6392. 10.3390/en17246392.
10. Nijnik, Maria. (2010). Carbon capture and storage in forests. *Iss Environment Sci Tech*. 29. 203-238.
11. Brotto, Lucio & Pettenella, Davide & Pra, Alex & Secco, Laura & Masiero, Mauro & Andrighetto, Nicola & Mammadova, Aynur & Vecchia, Ilaria & Florian, Diego & Vidale, Enrico & Leonardi, Alessandro & Corradini, Giulia & Chavarria, Ariadna & Tarabus, Ondrej & Tomasini, Sabrina & Cupit, Olivier & Fraisse, Mateo. (2018). Forest Management Auditing: Certification of Forest Products and Services. 10.4324/9781315745985.
12. Sreevani, P. (2018). Wood as a renewable source of energy and future fuel. AIP Conference Proceedings, 1992, 040007. <https://doi.org/10.1063/1.5047972>
13. Pilipenko, A. V. (2023). Gasification of wood fuel as a factor of sustainable development of bioenergy. *AIP Conference Proceedings*, 2948, 020033. <https://doi.org/10.1063/5.0165564>
14. Beluhan, S., Mihajlovski, K., Šantek, B., & Ivančić Šantek, M. (2023). The Production of Bioethanol from Lignocellulosic Biomass: Pretreatment Methods,

- Fermentation, and Downstream Processing. *Energies*, 16(19), 7003. <https://doi.org/10.3390/en16197003>
15. Tuong An Tran, T., Kim Phung Le, T., Phong Mai, T., & Quan Nguyen, D. (2020). Bioethanol Production from Lignocellulosic Biomass. IntechOpen. doi: 10.5772/intechopen.86437
 16. https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf
 17. Aggestam, Filip & Wollnik, Ronja. (2022). Circularity concepts in forest-based industries. United nations publications.
 18. Negi, H., Suyal, D. C., Soni, R., Giri, K., & Goel, R. (2023). Indian scenario of biomass availability and its Bioenergy-Conversion Potential. *Energies*, 16(15), 5805. <https://doi.org/10.3390/en16155805>
 19. Panwar, N., Kaushik, S., & Kothari, S. (2011). Role of renewable energy sources in environmental protection: A review. *Renewable and Sustainable Energy Reviews*, 15(3), 1513–1524. <https://doi.org/10.1016/j.rser.2010.11.037>

TEACHING LEARNING STRATEGIES: Classroom activities / Lab activities / Field Activities

MODE OF TRANSACTION: Online/Offline

ASSESSMENT RUBRICS

Evaluation Type	Marks
End Semester Examination	50
Continuous Evaluation	50
Total	100
Continuous Evaluation	
Seminars	20
Test papers	20
Assignment	10

SAMPLE QUESTIONS TO TEST OUTCOME

1. Differentiate between Linear Economy and Circular Economy
2. Describe the role of forest-based sectors in mitigating climate change
3. Compare the greenhouse gas profiles of wood with steel and concrete
4. Illustrate the cascading use of forest biomass with examples from wood-based industries.

KU02DSCWST103 ENGINEERING DESIGN AND PROTOTYPING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU02DSCWST103	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	4	1	50	50	100	2 hours

Course Description

This course provides an in-depth exploration of prototyping techniques and materials used for prototyping and will help to effectively communicate the ideas through engineering drawings. The course will also investigate sustainable prototyping practices with a particular emphasis on wood and bamboo.

Course Objectives

- To understand the characteristics of different materials used in prototyping.
- To clearly communicate concepts using engineering drawings.
- To understand how to use CAD tools to create cost-effective and efficient prototypes.
- To explore the possibilities of sustainable prototyping with wood and bamboo
- To become familiar with the contemporary technology utilised in prototypes

Course outcome

On completion of this course the student will be able to:

C01	Communicate design concepts using engineering drawings and visualization techniques
C02	Develop an understanding of different materials and manufacturing processes used in prototyping
C03	Choose the appropriate prototyping material and process for their product development.
C04	Acquire proficiency in variety of woodworking hand tools and power tools for developing prototypes
C05	Develop a strong emphasis on safety practices in prototyping with different materials

Mapping of COs to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓

Module 1 Engineering drawing for prototyping

Engineering drawing, importance of Engineering drawing in prototyping and product development, relationships of Engineering drawing with artistic drawing and other types of drawing, viewing an engineering drawing sheet, methods of sheet folding, drawing instruments, and drawing standards.

Module 2 prototyping materials

Material selection in prototyping. Properties of common materials used in prototyping. Wood and Metal prototyping; Resins and plastic prototyping: Introduction to basic metal working techniques including cutting, drilling machining and welding. Sheet metal fabrication, Polymers commonly used in prototyping. Introduction to Fused deposition modelling, Stereolithography methods for polymer prototyping. Health and safety in an engineering workshop.

Module 3 Wood and Bamboo as a sustainable prototyping material

Introduction to Wood and Bamboo as a sustainable prototyping material. Engineered wood products-plywood, MDF, particle boards and their applications. Familiarization with carpentry tools and woodworking machines, Practicing the basic woodworking tools and power tools used for marking, sawing, planing, and boring, Constructing important joints for lengthening, widening, and framing joints.

Module 4 Digital Technologies in product design and prototyping

Familiarizing the use of CAD in product design, Applications of Internet of things (IoT) systems in prototyping. Application of CNC machining and 3D Printing technologies in prototyping using different materials. Laser cutting and engraving

Module 5 (Teacher specific): Workshop activities / Lab activities / Product designing practice

Suggested Readings

1. Bjarki Hallgrímsson (2023) Prototyping and model making for product design: Second edition; Hachette UK
2. Kollmann,(1968): Principles of Wood Science & Technology- Volume I -Solid Wood, Springer-Verlage publications, New York
3. Gebhardt, Andreas & Hötter, Jan-Steffen. (2016). Additive Manufacturing 3D Printing for Prototyping and Manufacturing. 10.1007/978-1-56990-583-8.
4. Yang, Li & Hsu, Keng & Baughman, Brian & Godfrey, Donald & Medina, Francisco & Menon, Mamballykalathil & Wiener, Soeren. (2017). Additive Manufacturing of Metals: The Technology, Materials, Design and Production. 10.1007/978-3-319-55128-9.
5. Miller,M.R. *et.al.*,(2004): Carpentry and Constructions(4th Edition) ,The Mc Graw-Hill Companies,United State of America.
6. Khurmi R.S. & Gupta, J.K. (1981), A Text Book of Workshop Technology (Manufacturing Processes), S.Chand & Company Ltd, New Delhi, India
7. Um, Dugan. (2018). Solid Modeling and Applications. 10.1007/978-3-319-74594-7.
8. Chua, Chee & Leong, Kah Fai & Lim, Chu. (2010). Rapid prototyping: Principles and applications, third edition. 10.1142/6665.
9. Liou, Frank. (2007). Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development. 10.1201/9780429029721.
10. Bordegoni, Monica & Rizzi, Caterina. (2011). Innovation in Product Design: From CAD to Virtual Prototyping
11. Hoadley, R.B. (2000). Understanding Wood: A Craftsman's Guide to Wood Technology. The Taunton Press

TEACHING LEARNING STRATEGIES: Classroom activities / Lab activities / Field Activities

MODE OF TRANSACTION: Online/Offline

ASSESSMENT RUBRICS

Evaluation Type	Marks
End Semester Examination	50
Continuous Evaluation	50
Total	100
Continuous Evaluation	
Seminars	20
Test papers	20
Assignment	10

SAMPLE QUESTIONS TO TEST OUTCOME

1. How does the application of computer-aided design (CAD) software assist prototype processes in product development?
2. Discuss the importance of standardisation and conventions in engineering drawing and drafting practices.
3. Conduct drilling operation on wood using the given power tool
4. How does the choice of wood and bamboo as a prototyping material correspond with the sustainability aims in product development?
5. Discuss the diverse range of materials used in prototyping, ranging from traditional options like plastics and metals to innovative choices