



Dayanand Education Society's

# Dayanand Science College, Latur, Maharashtra, India

(Affiliated to Swami Ramanand Teerth Marathwada University, Nanded)



## Syllabus

## Inter-Disciplinary Courses

(2025-26)

By

### Academic Council

Dayanand Science College, Latur,  
Maharashtra, India.

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**Academic Council:**

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1.	Hon. Dr. Chetanji Sarda	Member, DESL	Chairperson	
2.	Hon. Ravindraji Rathi	Member, DESL	Member from Management	
3.	Hon. Pranavji Shaha	Member, DESL	Member from Management	
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5.	Prof. J. A. Angulwar	IQAC Coordinator	Member	
6.	Dr. Y. P. Sarnikar	HoD, Chemistry	Member	
7.	Prof. R. V. Solunke	HoD, Zoology & Fish	Member	
8.	Prof. C. S. Swami	HoD, Botany	Member	
9.	Dr. V. A. Chaudhari	HoD, Physics	Member	
10.	Dr. R. B. Shinde	HoD, Comp. Science	Member	
11.	Dr. R. A. More	HoD, Microbiology	Member	
12.	Miss. M. M. Pandit	HoD, English	Member	
13.	Dr. T. H. Mujawar	HoD, Electronics	Member	
14.	Dr. A. M. Chougule	HoD, Ind. Chemistry	Member	
15.	Dr. S. D. Birajdar	NAAC Coordinator	Member	
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18.	Mr. K. R. Bhise	Librarian	Member	
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20.	Ku. Parnavi Dhaware	General Secretary Stu.	Member	



# Inter-Disciplinary Certificate Courses (2025-26)



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Programme Coordinator

  
IQAC Coordinator  
IQAC - Coordinator  
Dayanand Science College  
Latur, M.S. (INDIA)

  
Principal  
Dayanand Science College,  
Latur



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**Inter-Disciplinary Courses**

<b>COURSE TYPE</b>	<b>INTER-DISCIPLINARY COURSES</b>
<b>COURSE DURATION</b>	<b>30 Hours</b>
<b>CREDITS</b>	<b>2</b>
<b>MODULES</b>	<b>4</b>

<b>Course Code</b>	<b>Course Title</b>	<b>Course Mentor</b>	<b>Contact Hours</b>
DSCL_CS_001	Digital Literacy & Emerging Technologies	Dr. R. B. Shinde	2 hours/Week.
DSCL_BT_001	Techniques in Biotechnology	Dr. A. A. Bidkar	2 hours/Week.
DSCL_FISH_001	Fresh Water Fish Culture	Dr. R. V. Solunake	2 hours/Week.
DSCL_MATH_001	Mathematics for Competitive Examinations	Miss. A. R. Andhare	2 hours/Week.
DSCL_MICO_001	Biostatistics and Research Methodology	Dr. R. A. More	2 hours/Week.
DSCL_BOTA_001	Natural Farming	Dr. C. S. Swami	2 hours/Week.

  
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Inter-Disciplinary Courses

Course Title	Digital Literacy & Emerging Technologies
Course Code	DSCL_CS_001

**Course Objectives:**

- To make Student become digitally confident and capable of using modern Tools effectively.

**Course Learning Outcomes (CLOs):**

- Use computers & smartphones confidently.
- Work professionally using Word, Excel, PowerPoint & Google tools.
- Understand IoT devices & basic functioning.
- Use AI tools for productivity, creativity & automation.
- Create digital projects and develop future-ready skills.

<b>Module 1</b>	<b>Digital Devices &amp; Internet Basics</b>
1.1	Introduction to Digital Devices
1.2	Internet Essentials
1.3	Online Communication & Collaboration
<b>Module 2</b>	<b>Advanced Office Automation Tools</b>
2.1	MS Word: Advanced Features
2.2	MS Excel: Basics to Intermediate
2.3	MS Excel: Advanced Tools
2.4	MS PowerPoint: Smart Presentations
<b>Module 3</b>	<b>Internet of Things (IoT) Basics</b>
3.1	Introduction to IoT
3.2	Google Workspace Tools
3.3	Preparing Google Form.
<b>Module 4</b>	<b>Artificial Intelligence Tools</b>
4.1	Basics of AI & Machine Learning
4.2	AI Productivity Tools
4.3	Creative & Automation AI Tools
4.4	Final Project + Presentation

**References:**

1. Computer fundamentals by :- P. K. Sinha
2. Internet & Web Page Design BPB Publication :- Dr. P. D. Murarka
3. Artificial Intelligence :- Elaine Rich



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**Inter-Disciplinary Courses**

<b>Course Title</b>	<b>Techniques in Biotechnology</b>
<b>Course Code</b>	<b>DSCL_BT_001</b>

**Course Objectives:**

- To know the basic Principles, working and application of biological techniques in Microscopy, Electrophoresis, Chromatography and Spectroscopy.

**Course Learning Outcomes (CLOs):**

- To know the basic Principles, working and application of biological techniques in Microscopy, Electrophoresis, Chromatography and Spectroscopy.
- They will use these biological techniques in Research and development.

<b>Module 1</b>	<b>Microscopy</b>
1.1	Light microscope, Fluorescence microscope.
1.2	Phase contrast microscope, Electron microscope.
1.3	SEM: Scanning electron Microscope, TEM: Transmission electron microscope.
1.4	Stereo-microscope, X- ray microscope.
<b>Module 2</b>	<b>Chromatography</b>
2.1	Principles of chromatography, Thin layer chromatography (TLC), Paper chromatography.
2.2	High performance liquid chromatography (HPLC), LC-MS.
2.3	Gas liquid chromatography (GLC),GC-MS.
2.4	Ion-exchange and affinity chromatography, Maldi ToF.
<b>Module 3</b>	<b>Electrophoresis</b>
3.1	Electrophoresis: General principles, SDS-PAGE , Native gels, Gradient gel.
3.2	Iso electric focusing, 2-D gel electrophoresis (2-D PAGE), Detection.
3.3	Electrophoresis of nucleic acids: agarose gel electrophoresis of DNA, DNA sequencing gels.
3.4	Pulse field gel electrophoresis, Capillary electrophoresis.
<b>Module 4</b>	<b>Spectroscopic techniques:</b>
4.1	Properties of electromagnetic radiation, interaction with matter. Gamma ray spectroscopy, X-ray spectroscopy.
4.2	UV and Visible spectroscopy, Infrared and Raman spectroscopy, Electron spin resonance spectroscopy, Nuclear magnetic resonance spectroscopy.
4.3	Circular dichroism spectroscopy, Atomic spectroscopy, x-ray diffraction, x-ray crystallography.
4.4	Spectrofluorometric, turbidometry and nephelometry.

**References:**

1. D. Freifelder, Physical Biochemistry, W. H. Freeman. 1982
2. A. Hofmann, J. M. Walker, K. Wilson, S. Clokie, Principles and Techniques of Biochemistry and Molecular Biology; Cambridge Press. 2018.
3. David T Plummer, Practical Biochemistry, Tata McGraw- Hill. 2001.



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 Inter-Disciplinary Courses

<b>Course Title</b>	<b>Fresh Water Fish Culture</b>
<b>Course Code</b>	<b>DSCL_FISH_001</b>

**Course Objectives:**

- To introduce student to various types of aquaculture methods.
- To impart knowledge of fishery science, and fish processing.
- To understand and appreciate the role of Government in aquaculture development.

**Course Learning Outcomes (CLOs):**

- Knowledge and understanding of aquaculture methods and fish processing.
- Knowledge and understanding of the role of government agencies in development of aquaculture.
- Students are aware about Indian major carp culture

<b>Module 1</b>	<b>Construction of fish farm</b>
<b>A.</b>	<b>Layout, design and construction of different types of pond</b>
i.	Hatching pits
ii.	Nursery pond
iii.	Rearing pond
iv.	Stocking pond
<b>B.</b>	<b>Physical chemical and biological factors affecting fish culture.</b>
<b>Module 2</b>	<b>Fish farm management</b>
<b>A.</b>	<b>Assessment of Water Quality</b>
i.	O <sub>2</sub> (Oxygen)
ii.	CO <sub>2</sub> (Carbon Dioxide)
iii.	PH
<b>B.</b>	<b>Managing operations like feeding, harvesting</b>
<b>Module 3</b>	<b>Internet of Things (IoT) Basics</b>
<b>A.</b>	<b>Indian Major Carps</b>
i.	<i>Catla</i> (Biology, Aquaculture, composite farming and economic significance.)
ii.	Rohu (Biology, Aquaculture, composite farming and economic significance.)
iii.	Mrigal (Biology, Aquaculture, composite farming and economic significance.)
<b>B.</b>	<b>Food and Feeding</b>
i.	Feed type
ii.	Feed management
iii.	Pellets
<b>Module 4</b>	<b>Diseases of Freshwater Fishes</b>
<b>A.</b>	<b>Common Bacterial Diseases</b>
i.	Columnaris: Fuzzy patches (like cotton) on skin/gills, often after injury or

	stress.
ii.	Furunculosis: Red sores (furuncles) or ulcers on the body.
iii.	Fish Tuberculosis: Wasting curved spines, loss of color/scales, internal issues.
<b>B.</b>	<b>Common Parasitic &amp; Fungal Diseases</b>
i.	Ich (White Spot): Tiny white spots on body/fins, like salt grains.
ii.	Velvet: Dusty, rust-colored film on skin.
iii.	Fungus: White, cottony growths on skin, gills, or fins, especially in dirty water.

### References:

1. Textbook of Fishery - Surekha M Gupta.
2. Fish & Fisheries (Second Edition) – Pandey & Shukla
3. Fresh Water Fish culture – Dr. A. N. Kulkarni
4. Principles of Aquaculture – S. B. Zade, C. J. Khune, S. R. Sitre & R. V. Tijare



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**Inter-Disciplinary Courses**

<b>Course Title</b>	<b>Mathematics for Competitive Examinations</b>
<b>Course Code</b>	<b>DSCL_MATH_001</b>

**Course Objectives:**

- To develop a clear understanding of different types of numbers and basic arithmetic operations.
- To enhance problem solving skills related to real-life and competitive examination arithmetic.
- To build a strong foundation in basic algebraic concepts and techniques.
- To introduce geometrical figures and measurement concepts systematically.

**Course Learning Outcomes (CLOs):**

- Students acquire strong number sense and are able to perform accurate and efficient calculations.
- Students can solve application-based arithmetic problems quickly and accurately in competitive exams.
- Students can solve algebraic equations logically and apply identities effectively.
- Students are able to compute area, volume, and surface area with confidence and accuracy.

<b>Module 1</b>	<b>Number System</b>
1.1	Natural, Whole, Integer, Rational and Irrational Numbers
1.2	Fractions and Decimals
1.3	BODMAS
1.4	LCM and HCF
1.5	Divisibility Rules
1.6	Squares and Cubes
<b>Module 2</b>	<b>Arithmetic (Core Topics)</b>
2.1	Percentage
2.2	Ratio and Proportion
2.3	Average
2.4	Profit, Loss and Discount
2.5	Simple Interest (SI)
2.6	Compound Interest (CI)
2.7	Time and Work
2.8	Time, Speed and Distance
2.9	Mixture and Alligation
2.10	Partnership
2.11	Pipes and Cisterns (Basic)
<b>Module 3</b>	<b>Algebra (Basic)</b>

<b>3.1</b>	Linear Equations
<b>3.2</b>	Quadratic Equations (Basic)
<b>3.3</b>	Algebraic Identities
<b>3.4</b>	Surds and Indices
<b>Module 4</b>	<b>Mensuration and Geometry</b>
<b>4.1</b>	Perimeter and Area (Triangle, Square, Rectangle, Circle)
<b>4.2</b>	Surface Area and Volume (Cube, Cuboid, Cylinder, Cone, Sphere)
<b>4.3</b>	Basic Geometrical Properties

### References:

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publishing.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publishing.
3. Arun Sharma, How to Prepare for Quantitative Aptitude for CAT, McGraw Hill Education.
4. Kiran Prakashan, MPSC Combined Examination – Mathematics & Reasoning, Kiran Institute of Career Excellence.
5. Rajesh Verma, Fast Track Objective Arithmetic, Arihant Publications.
6. Magical Book on Quicker Maths, M. Tyra, BSC Publishing Co. Pvt. Ltd.
7. S. Chand's Objective Mathematics, S. Chand Publishing.
8. Previous Years' Question Papers of MPSC, Maharashtra Public Service Commission Publications.



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<b>Course Title</b>	<b>Biostatistics and Research Methodology</b>
<b>Course Code</b>	<b>DSCL_MICO_001</b>

**Course Objectives:**

- To understand fundamental statistical concepts used in biological and health sciences.
- To develop skills for data collection, classification, summarization, and presentation using appropriate statistical tools.
- To apply basic statistical tests (parametric and non-parametric) for analyzing biological and research data.
- To understand principles of research methodology, including study design, sampling methods, and hypothesis formulation.
- To develop the ability to interpret statistical results and draw valid scientific conclusions.
- To enable students to prepare research proposals, write research reports, and follow ethical practices in conducting and presenting research.

**Course Learning Outcomes (CLOs):**

- Students will be able to define and explain basic concepts of biostatistics, including data types, measures of central tendency, and measures of dispersion.
- Students will be able to organize, summarize, and present biological data using tables, graphs, and descriptive statistics.
- Students will be able to apply appropriate statistical tests (t-test, chi-square test, correlation, regression, ANOVA) to analyze scientific data.
- Students will be able to identify suitable research designs and sampling methods for biological and health-related studies.
- Students will be able to formulate research problems, hypotheses, and objectives, and plan a methodologically sound study.
- Students will be able to interpret statistical outputs, draw scientific conclusions, and prepare research reports following ethical guidelines.

<b>Module 1</b>	<b>Biostatistics</b>
1.1	Measures of Central Tendency- Mean, median, mode, Measures of Dispersion.
1.2	SD, variance, CV, range.
1.3	Probability Basic -Rules, events, examples Normal Distribution-Curve properties, Z-scores, Sampling Distribution & SE-CLT, standard error.
1.4	Parametric Tests-t-tests, ANOVA basics, Chi-square Test-Goodness of fit, association, Important Characteristics of Chi-Square Test and caution.
<b>Module 2</b>	<b>Research Methodology</b>
2.1	Meaning of research, Objectives of research, Types of research.
2.2	Research approaches, Significance of research, Research methods versus

	methodology.
2.3	Research processes, Criteria for good research. Research Ethics Consent, confidentiality, plagiarism
<b>Module 3</b>	<b>Research Design and Sample Surveys</b>
3.1	Meaning and need for research design, features of a good design.
3.2	Research hypothesis, Experimental and non-experimental hypothesis – Testing research, Experimental and control group.
3.3	Different research designs:
3.4	Sampling Design, steps in sample design, criteria of selecting a sampling procedure, characteristics of a good sample design, different types of sample design.
<b>Module 4</b>	<b>Data Collection and Data Processing</b>
4.1	Types of data: Primary vs. secondary data, qualitative vs. quantitative data.
4.2	Sampling techniques: Probability and non-probability sampling, sample size determination. Methods of data collection: Surveys, interviews, questionnaires, observations, experiments, and existing records.
4.3	Tools for data collection: Designing questionnaires, scales, checklists, and validated instruments. Errors in data collection: Sampling errors, non-sampling errors, bias, and methods to minimize them.
4.4	Data processing, processing operations: editing, coding, classification, tabulation, graphical representation (bar, histogram, pie chart)

### References:

1. Michael Alley, The Craft of Scientific Writing (3rdEdition), Springer, New York,1996.
2. Philip Reubens (General editor), Science and Technical Writing– A Manual of Style (2ndEdition), Routledge, New York,2001.
3. C. R. Kothari, (2004) Research Methodology, Published by New Age International (P) Ltd., Publishers New Delhi.
4. Ranjit Kumar (2014) Research Methodology A Step-by-Step Guide for Beginners, SAGE Publications.
5. R. Panneerselvam (2014) Research Methodology, PHI Learning publisher.
6. Uwe Flick (2014) Introducing Research Methodology, A Beginner's Guide to Doing a Research Project, SAGE Publications.
7. Jason Puckett (2011) Zotero: a guide for librarians, researchers and educators, published by American Library Association.



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Inter-Disciplinary Courses

Course Title	Natural Farming
Course Code	DSCL_BOTA_001

**Course Objectives:**

- To understand concept of bio-fertilizers & bio-pesticides.
- To utilize naturally available organisms for human welfare.
- To improve soil fertility by promoting use of bio-fertilizers.
- To reduce the economic losses and harmful effect of chemicals fertilizers and pesticides.

**Course Learning Outcomes (CLOs):**

- Students will understand the concept of bio-fertilizer and bio-pesticide
- Students will know about naturally available bio-fertilizers and bio-pesticides for human welfare.
- Students will learn the improvement of soil fertility.
- Students will understand the economical and harmful effects of chemical fertilizers and pesticides.

<b>Module 1</b>	<b>Bio-fertilizers –I</b>
1.1	Introduction and definition
1.2	Character, cultivation and quality control of <i>Rhizobium</i> and <i>Azotobacter.s</i>
1.3	Character, cultivation and quality control of <i>Azolla</i> and <i>Cyanobacteria</i>
<b>Module 2</b>	<b>Bio-fertilizers-II</b>
2.1	Character, cultivation and quality control of <i>Acetobacter</i> and <i>Azospirillum</i>
2.2	Character, cultivation and quality control of phosphorous solubilizing microorganisms. ( <i>Pseudomonas striata</i> , <i>Bacillus polymyxa</i> , <i>Aspergillus awamori</i> & <i>Penicillium digitatum</i> )
<b>Module 3</b>	<b>Bio-insecticides</b>
3.1	Introduction and definition
3.2	Cultivation and application of <i>Beveauria bassiana</i> , <i>Verticillium Lecanii</i> & <i>Bacillus thuringiensis.s</i>
<b>Module 4</b>	<b>Bio-control of plant diseases</b>
4.1	Introduction and definition
4.2	Cultivation and application of <i>Trichoderma sp.</i> , <i>Bacillus sp.</i> , and <i>Pseudomonas sp.</i>
4.3	Use of Plant Extract as Bio-control agents

**References:**

1. Plant Pathology - Pathogen & Plant Disease - B. P. Pandey , S. Chand & Company Pvt. Ltd. New Delhi.
2. Introduction to the Principles of Plant Pathology - R.S. Singh, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Management of Plant Diseases- B.B.S. Kapoor & N.K. Khatri Madhu Publications, Bikaner
4. Bio-fertilizers for sustainable agriculture - A. K. Sharma, Agrobios (2002)