

LEARNING MANAGEMENT SYSTEM (LMS)

DEPARTMENT OF BIOTECHNOLOGY

SEM-I : Cell biology and Genetics:

UNIT	TOPICS	E-CONTENT
1.Cell Structure and Functions	Prokaryotic and Eukaryotic cell structure	http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kO DBJdWRCTmg3TUE3WTJIYjd1VU1CK1pCdTQvdEpxRHRPb08rd2ovbWZMUnNHVDZhYmVqNy9vcmcvMU5PL29POV NzRmRJWUVzWGtGYzJmQlVERWI5VWJmUisrdzI3TjQ9
	Chromosome structure and organization	http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kO DBJdWRCTmg3Qy9jMVNnYzJlb3VYUzBBQTlInmVSMXBJa WM2VTRXa2c2NkjbWVlOWx4eUJaTDQ0T2hxS0JyMG5r MDkvbWVhYlVkQjRoMHJsQnV0WXlYQjRBb1psRk09
2.Cell division and cell cycle	Cell differentiation and cell death	http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kO DBJdWRCTmg3TUE3WTJIYjd1VU1CK1pCdTQvdEpxRHRPb08rd2ovbWZMUnNHVDZhYmVqN1BBNUdaU2tDcVZ3Wk 5ZZEtTbExaQ0c5bDBndUh4OFZsdUdrcno4bThmTU5UWX gyVHhaRStHYWIMcWxrK3RmNTE
	Mendelians genetics	http://ndl.iitkgp.ac.in/document/bnZnR2hPaUVqRU9TbFc2Rmp1MVJzNnRBZINXdDFETEh3YXRVSVR0SkZvZz0 http://ndl.iitkgp.ac.in/document/bnZnR2hPaUVqRU9TbFc2Rmp1MVJzMhdNdnVWSDVKUjB0bDVUQINpSGtpVT0

SEM-II : Biological Chemistry and Microbiology

Unit	Topic	E-content
1. Biomolecules	Carbohydrate, proteins, Fatty acids, Nucleic acids	<p>http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kODBJdWRCTmg3RE9Ya2grL0g1dzU0dVd1SDZMYWtmQkJlbgFiN1Q5aXFzaERhbStQTIR2V2o0UERaTmRiTtkkydWZQell0UUIjV2c9PQ</p> <p>http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kODBJdWRCTmg3TWWhscFBubVExa25iUjdFQXRhZjJscHhkYTYzbmgYeDNXa2g2eXY5eHk4SGJzUzQrc1IISFRmaHlqSXZLVThxSldJWms2Z1h3ZTNPTWx2Y1JKMDVscIU9</p> <p>http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kODBJdWRCTmg3SDRxbDFHRndWcnpmSjRpUlhra0UvQ085cU9lZG1JbUICN3B4THVmeS96UVJnclwRWs2RUx2OHkwM25yald0ZWc9PQ</p>
2. Bioenergetics	Metabolic cycles(TCA, krebs, Gluconeogenesis, beta oxidation)	<p>http://ndl.iitkgp.ac.in/document/c250eVjKSkdsa3cyUGpVN2xwU1RQtkVIWTBOZEdIY3pHTGRuWnNXeGhjWTO</p> <p>https://microbenotes.com/fatty-acid-synthesis/ https://microbenotes.com/beta-oxidation-of-fatty-acid/</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUVWmpzQ2loVXVEaHh5bzJVnzFyZlZMb016azdZd0ZSQis1akhtZXd1N0NtZDVdDdWIJWA</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUVWmpzQ2loWVBSR0IPTmtxNktSNktHcnZOuW0rRzVKZmxwcDNMWEFaMzFTbmZib1BJNg</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUVWmpzQ2loU05nWVpuRVAYVHNYNmFRMHM5RU82OTFoOHRIYUR5bU5yNUN6d1owR0s4eg</p>
3. Fundamentals of Microbiology		<p>Introduction to microscopy: http://ndl.iitkgp.ac.in/document/dmxPNnJUMWRoU05UQk50MHVIRIQ5SUR0RlpnMXNtUndWbnE3VE54YUo1OD0</p> <p>Transmission microscopy: http://ndl.iitkgp.ac.in/document/eUJ5RFk4S3pISG1McXpCN2JPTk1QNkxYM0Mvemd0TmdrbDVZNFcvd2dZTEZxc3I3S3oyWGIVeHZOMldkMGdwZg</p> <p>Fluorescence microscopy: http://ndl.iitkgp.ac.in/document/eUJ5RFk4S3pISG1McXpCN2JPTk1QemtITXE3d3daZ1Q4THIBU0JIVlIpRVV3NWpTOGticmdDUENUeXEyeWixTA</p>

		<p>Dark field microscopy: http://ndl.iitkgp.ac.in/document/QXBqK1czOUpyM3FlamVjTmREMWFQIZ0L1g0YW1OSVEvczFLQ1NaNFZFTy9NWmpRT0IFNTNIT3l0dml3VFV2NQ</p> <p>Scanning electrom microscopy: http://ndl.iitkgp.ac.in/document/YkxIRXFvZXJrTDBkvzVVZi9ESjl6NmF1UXVTOGtSYVJOYWx0ODFBWkdvNVNITW0vWjhpVIZhclIKSIVIT1haNg</p> <p>Light microscopy: https://dl.acm.org/doi/10.1145/1179352.1141976</p> <p>Bacteria: https://flexbooks.ck12.org/cbook/ck-12-biology-flexbook-2.0/section/7.3/primary/lesson/prokaryote-structure-bio/</p> <p>Viruses: http://ndl.iitkgp.ac.in/document/NW9aZUt2R2VST0JkSOJ1SDQ3N3BCOUFLUWluUUpsai9GWEZleVQ0YUhrz0</p>
<p>4. Culture and Identification of microorganisms</p>		<p>https://microbiologynote.com/bacterial-growth-curve/ http://ndl.iitkgp.ac.in/document/OEYweXpIRmlkYURkM3JkbUdtKy9UUmG4SWxaWFF3VWIWYmo4THdwTHNubIE3NnVKK0dMejNxQkp0eXV1WFkyYmJnbLhLTEJpNFVpWFZIRW0wKzRFGc9PQ</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUVWmpzQ2loU2dKa3lpRXZHamRwWmRHcUE3YTQzclRlcjVFMDhIYIB4Mk1ocGFwejVNRw</p> <p>Notes: https://in.docworkspace.com/d/sINCO0OZJi_ringY</p>

SEM-III: Molecular biology and Recombinant technology

Unit	Topic	
1-Genome organization and DNA replication		
2-Gene expression in prokaryotes	Prokaryotic and Eukaryotic gene structure, transcription, Genetic code	<p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loVEpYaXZSTGc0MWRSWFZQb1N3c2ZJWnhqazF1T2NldVpKem8vODQrR29SMA</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loVkZiaHN2MkN5c1d0SDdPNXJ1ZWErOHZHZVpKQmhDckJScHMyZ3Bod2JZeQ</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZUdGRnEva0hYN1RQcU9rQVd oMTkwSihKMFFiZjNZUFZSMFE0dEdRRkRSZA</p> <p>http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kODBJdWRCTmg3TUE3WTJYjd1VU1CK1pCdTQvdEpxRHRPb08rd2ovbWZMUnNHVDZhYmVqNy9vcmcvMU5PL29POVNzRmRjWUVzWGtGyZJmQlVERWI5VWJmUisrdzI3TjQ9</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loU05nWVpuRVAYVHNYNmFRMHM5RU82OWJQUTByNXRFd2IzN2xteEI5MjZjUg</p>
3- Gene regulation in Prokaryotes and Eukaryotes	Gene regulation, Post transcriptional and translational modification	<p>http://ndl.iitkgp.ac.in/document/cVpQaHNXaWhCRDIRQXixM2IQRkFQMXpvRlpJQzRQMEExFMVBIT2ILUjdQNDO</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loUVFJYy9UczN6Ykk4anFWRWhuL09Qb2tSN2dwdFk4Zk1IYXNldTc4OThZWg</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loU2M5VUJNa0IsSGNBa1RWUCtiZEZWRnNVYkpvSTNtaTg0cVhMNngvTIZmNw</p> <p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY1A1OWINTGpiUDdGeE55SGVQUmc2VktM1UyZfQ3K0VYbWhUOTRvQlInNQ</p> <p>Notes: https://in.docworkspace.com/d/sINu00OZJo_fingY</p>
4: Recombinant	Gene Vectors, Gene transfer	<p>http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY1A1OWINTGpiUDdGeE55SGV</p>

<p>DNA technology</p>	<p>techniques, Applications of RDT</p>	<p>QUmc2WHBtMTVtN0lybitrdVA4djA4QTdYNw</p> <p>http://ndl.iitkgp.ac.in/document/Qk4R2FGUkRNZjFicFUvWmpzQ2loVHFvWmdTMXJyMXhkQkRwK0JYZ3NZcUpUcVJtSXVuUTINVWhyV3IRNEF6MQ</p> <p>http://ndl.iitkgp.ac.in/document/Qk4R2FGUkRNZjFicFUvWmpzQ2loU241eFVkUzRFWFR4cG01eFhReDJuVklTQ2VjRktoYmdzOFIpcjZFZmdUMw</p> <p>http://ndl.iitkgp.ac.in/document/Qk4R2FGUkRNZjFicFUvWmpzQ2loY1EzUjZUc3dvRS9EKzltN0haRlNICHZkZjR5OEphRUNNVIZCZldsM0kzSQ</p> <p>Notes: https://in.docworkspace.com/d/sIHm00OZJ0vbingY</p>
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SEM-IV: Bioinformatics and Biostatistics

Unit	Topics	E-content
1 Introduction to Bioinformatics and Biological databases	Bioinformatics- history, scope tools and resources, biological data bases	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQVc5cnRDMTFUd3VxNHhialVkdIhLeWNVWS82ajZkVnFucGVjQk5FbzIWRGc9PQ
2 Sequence alignment	Scoring matrices, FASTA ,BLAST	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQVc5cnRDMTFUd3VxNHhialVkdIhLeVnKQXgvdzQvMHkvMFRCSFNWdFUwW http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQVc5cnRDMTFUd3VxNHhialVkdIhLeWpjMDc0VknNaSIY0MzJEbmZnZVRkcFNHV0Y3aHNGK3hUbzRBVWFQcnV3YXM9
3 Biostatistics I and II		http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQkl0dFIOYXdZbkpTY3RXd1IPN09Xb1FrM05mTFE1MznqZi8vNGxWZ294OVE9PQ http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQkl0dFIOYXdZbkpTY3RXd1IPN09Xb1JHL2N2dENXWjlpYnl4TEVIV2Y0TG8zVlp1UTZIVGZBcUY5ZkFuMXhTaDQ9 http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDWNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zQkl0dFIOYXdZbkpTY3RXd1IPN09Xb05nV205WHdJcGFgdVZsdnA4YWF1M3BKSzB0V0FiYnpSb21qTytWaEdtU0U9

SEM-V : Plant Biotechnology

Unit	Topics	E-content
1.Fundamentals of Plant Tissue Culture	Laboratory organization, nutritional requirements, plant growth hormones	http://ndl.iitkgp.ac.in/document/Z2JzN0ZmU2VhdW5kODBJdWRCTmg3QUthaElOQjg4WWWhJQjNUcEpKdG03ZnRDZE9pb1pWQ0FPNctZZVROyUIZMXJvenVPVvhKeEFYbIRNSzN6ZWJrQXc9PQ http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWVVTR0xaZi9mMC9Ed0tpbEJxTIBIL3k2TjFiSIIOWpGYTZsSEXT2xuc0U9
2.Applications of Plant tissue culture	Meristem culture, Somaclonal variation, Cell suspension cultures, cryopreservation	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWURudzZNS2ZGbhDqamJUyIJtGhgM3VycDd5eVRSK3IRb1NLWURtdklJWm89 http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWURudzZNS2ZGbhDqamJUyIJtGhgM3VycDd5eVRSK3IRb1NLWURtdklJWm89
3 Production of Transgenic plants	Gene transfer methods, Agrobacterium mediated transformation, Viral vectors	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWTVvbGRjRXI1U0JoZVNszFAvdWpUblV0Qk9kVUZTZWNwcHRjQIY0VFVwTkk9 http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWW9FeDU10ThGTmpRSEd5N3IzRGJMY1UwT0pgSDZuM0lyWWRMWXZIMzFaYUE9
Applications of Transgenic plants4 Recombinant DNA Technology	Biotic ,abiotic, Herbicide and insect resistant plants,Plantibodies, Plant as bioreactors	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxWdNoYW05dU5aVXRhUnh4N2hyMjBKWS92Ry9zRE11U2hDV2VBTDJObmYyeGN2V2JKWWJGQTnvWkRsNGVRT2FNQzVWU2EydFZMOGJwVvy9MdDg5Y0YrTmhPSE5Cc0k9

SEM-VI : Environmental Biotechnology

Unit	topics	E-content
1.Environmental pollution	Pollution,types of pollutants, monitoring methods	<p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05aTVuUVhHME9HRIJpUk5WQzZwazRGa282R2xvQ3V3ek5ndXdxWG1wV0hnczlMdlFqTVhQT0x5Rm5kWHNLNGI4YWtSY2JoeUxVaWRJRHZTMm5IQ2NMdWJJYXIVOXp0a0JUTXZvdkpLSVZ4VTA</p> <p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05aTVuUVhHME9HRIJpUk5WQzZwazRGa282R2xvQ3V3ek5ndXdxWG1wV0hnczlMdlFqTVhQT0x5Rm5kWHNLNGI4YXBkSVU1S0RiSjJhQ09HQkdRcU90RDdlSGdqTW9RdXJkeC9XaVNM T082VVk</p>
2.Biomass and biofuels	Types of biomasses, Biofuel production from organic wastes	<p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05dU5aVXRhUnh4N2hyMjBKW S92Ry9zQjF2N29QWDJaQ2h6TWRwUENRdmIDZk xvWkdmSnRrNUlxbjVMSIBlaDdQclhENkpkNVVHd 2tweijJTjNjdXB6bTQ9</p> <p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05dU5aVXRhUnh4N2hyMjBKW S92Ry9zQjF2N29QWDJaQ2h6TWRwUENRdmIDZ mdtZzNmUIRoc3V2cldmWUhpZVVPeU1KbDIRaHp CeTdLd3dzcmx4a1VPNXM9</p>
3.Biofertilizers and biopesticides	Concept of Biofertilizers and bioinsecticides	http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05aW9HRitYdjk4T3IJNzk5VIFJe U5jVkJacm0zdU5QsJRDUzE2QUdvdVIHQllLeVFHS nJveHpkVG0vRWlCd0x0RXhQZIBTdEhNTzICeHrzd 1lodFiUEU9
4.Bioremediation of environmental pollutants	Solid and liquid waste management, bioremediation	<p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05aTVuUVhHME9HRIJpUk5WQzZwazRGa282R2xvQ3V3ek5ndXdxWG1wV0hnczlMdlFqTVhQT0x5Rm5kWHNLNGI4YWphdVc4djFsc EwvUlhJcnA1bVlrRkdJM0ptemNXTzhXSnhVWWRI bm1XTkg</p> <p>http://ndl.iitkgp.ac.in/document/S1loNUNiRE91VEk4NzFxDNoYW05aTVuUVhHME9HRIJpUk5WQzZwazRGa282R2xvQ3V3ek5ndXdxWG1wV0hnczlMdlFqTVhQT0x5Rm5kWHNLNGI4YWdqQkRydHhv UERrY05CTWQ5M0h4SU5MUVY4TlhBK09STHpgV FA4ODF1aEo</p>

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SEM-6 : Applied microbiology

<p>Unit-1 Microbial products for small scale entrepreneurs</p>		<p>http://ndl.iitkgp.ac.in/document/NDJ0OFIHMIBvbml1K1RzcEUxa04rY0Q1VGvjdlVCbkUrVVAxclczSGpxZXZKZmlwbVdmRnJgRnFZVWFkNldSNzIzYnI4ZjZtYWwM3TStnLzhDQ1ltWmc9PQ</p> <p>http://ndl.iitkgp.ac.in/document/bS8vQWM5U2E yeVJkZnlhOUNkcDBheUpFK1dxUHZ5Zm8xWnBa WEJvdKZMOD0</p> <p>http://ndl.iitkgp.ac.in/document/eXExVkcwcFR4 QXBNL3NrUEIXWDVqWHJKRE9wV1N4N3RTem1J Q1ZjbS8yeEZWNEw2cExVSzY2RUdZaWd6ZHgvTkk xS2NwNjluVWpla3hvemUrQ1haMIE9PQ</p>
<p>Unit-2 Metabolic engineering for microbial products</p>		<p>http://ndl.iitkgp.ac.in/document/ZkpDTmJ3RDFK bG9LcmFURmZKMXJwSjhUNzdNUIV4RHVVtZfqN UJqQWd0WT0</p>
<p>Unit-3 Microbial diagnosis and health</p>		<p>http://ndl.iitkgp.ac.in/document/OFJCNlgyTDVV b3NGWIE5bUZWWDIIQWNLUkRIYIZYchK2a3g2S2 FNRkovbz0</p>