SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY Page 1 of 8

Department of Information Technology		LP: BT22101 Rev. No: 02 Date: 09/01/2025
B.E/**B.Tech**/M.E/M.Tech **: B.Tech**	**Regulation: 2022**	
PG Specialisation :NA		
Sub. Code / Sub. Name :BT22101/Biology for Engineers		
Unit : I Introduction	**(8 Hrs)**	

Unit Syllabus: Origin of life and Evolution, Cells - Prokaryotes and Eukaryotes, Biochemical nutsand bolts - water, carbohydrates, lipids, proteins, DNA, RNA and enzymes,Introduction to metabolism, Mendelian genetics, Chromatin, DNA structure,replication, transcription and translation. Human system - skeletal structure, types ofconnective tissues, structure of joints, muscle and organ structure and function,cardiac physiology, blood properties and flow, nervous system. Plant systemorganization of plants, Photosynthesis and Respiration, Growth and DevelopmentHormones. Microbial system - Bacteria, yeast, fungi, protozoan, Algae and virus.

Objective: To illustrate the unit of life and its function

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Origin and evolution of life	TB2 Pg.16-33, TB3 Pg.33-55, RB4 Pg.16-24	LCD/ BB
2.	Cells – Prokaryotic and Eukaryotic cell structure and function	TB3 Pg.9-22, TB3 Pg.28-31, RB4 Pg. 32-39	LCD/ BB
3.	Biochemical nuts and bolts - water, carbohydrates, lipids, proteins, DNA, RNA and enzymes	TB3Pg.24-29, RB4 Pg. 46-48, 39-43, 59-63	LCD/ BB
4.	Mendelian genetics, Chromatin, DNA structure, replication, transcription and translation.	TB3 Pg.178-182, RB4 Pg. 84-90, 123-137, TB3Pg.184-206	LCD/ BB
5.	Human system - skeletal structure, types of connective tissues, structure of joints, muscle and organ structure and function	TB2Pg.175,178-180, RB4 Pg. 168-172	LCD/ BB
6.	Cardiac physiology, blood properties and flow, nervous system	TB2Pg.190, RB4 Pg. 176-179	LCD/ BB
7.	Plant system organization of plants, Photosynthesis and Respiration, Growth and Development Hormones	TB2Pg.143-153	LCD/ BB
8.	Microbial system - Bacteria, yeast, fungi, protozoan, Algae and virus	TB2Pg.226-288	LCD/ BB
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins

Sub. Code / Sub. Name: BT22101/ Biology for Engineers

Unit :IIApplication of Biological Principles In Engineering (12 Hrs)

UnitSyllabus: Biological functions for Camera for imaging, image recognition, visual informationprocessing,InformationandCommunicationTechnologies,memristor,optoelectronic, speech recognition, smart sensing, sensorimotorics, neuromorphic andartificial intelligence. Biology in biomimicry – Sharkskin inspired swimsuits, Burrinspired Velcro, Whale fin inspired wind turbine blades, cooling fans, airplane wingsand propellers, lotus inspired paintbrushes, Stenocara shell inspired water collection,skeletonstructureofblowfishinspireddesigningofvehicles,termitesandScyliorhinuscanicular inspired architecture and natural colour inspired nanophotoniccrystal.

Objective: To study the implications of engineered products and process on living matters

Session No *	Topics to be covered	Ref	Teaching Aids
9.	Biological functions for Camera for imaging,	RB5 Pg. 41-55	LCD/ BB
10.	Image recognition, visual information processing	RB5 Pg. 41-55	LCD/ BB
11.	Information and Communication Technologies	RB8 Pg. 1-42	LCD/ BB
12.	Memristor, optoelectronic, speech recognition	Internet Source 28	LCD/ BB
13.	Smart sensing, sensorimotorics, neuromorphic and artificial intelligence	RB5 Pg.77-99	LCD/ BB
14.	Biology in biomimicry	RB5 Pg.1-16	BLV 1
15.	Sharkskin inspired swimsuits, Burr inspired Velcro, Whale fin inspired wind turbine blades	Internet Source 34,35	LCD/ BB
16.	Whale fin inspired cooling fans, airplane wings and propellers	Internet Source 28	LCD/ BB
17.	Lotus inspired paintbrushes, Stenocara shell inspired water collection	Internet Source 29,30	LCD/ BB
18.	Skeleton structure of blow fish inspired designing of vehicles	Internet Source 31	LCD/ BB
19.	Termites and Scyliorhinus canicular inspired architecture	Internet Source 32	LCD/ BB
20.	Natural colour inspired nanophotonic crystal	Internet Source 33	LCD/ BB
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins

Sub. Code / Sub. Name: BT22101/ Biology for Engineers

Unit : III Application of biological principles in Engineering(12 Hrs)

Unit Syllabus: Case study on workload ergonomics, system ergonomics and information ergonomics,Ultrasound imaging, X-Ray and PET scanning, Bioelectromagnetism - Touch ScreenTechnology, Force and torque sensor, inertial sensing technology and motion capture systems, Human-in-the-loopprocess, Bioactuators, Biocybernetics, Biotelemetry, Bionic(rehabilitation), Bioreactor, Bioremediation, Biofertilizer, Bioenergy, Biosensors, Biopolymers, Biofilters, Biochips, Microbial fuel cells in vehicles. Biotechnological reliance in space, agriculture and nuclear energy.

Objective: To understand biological function for the application in the product and processEngineering

Session No *	Topics to be covered	Ref	Teaching Aids
21.	Case study on workload ergonomics, system ergonomics and information ergonomics	TB5 Pg. 3-32, 243-273	LCD/ BB
22.	Ultrasound imaging, X-Ray and PET scanning	TB4Pg.507-683, Internet source 25, 26, 27	LCD/ BB
23.	Bioelectromagnetism - Touch Screen Technology	Internet resource 3	LCD/ BB
24.	Force and torque sensor	Internet resource 17	LCD/ BB
25.	Inertial sensing technology and motion capture systems	Internet resource 18,19,20	LCD/ BB
26.	Human-in-the-loop process, Bioactuators, Biocybernetics	Internet resource 21,22	LCD/ BB
27.	Biotelemetry, Bionic(rehabilitation)	TB4-Pg.283-303	LCD/ BB
28.	Bioreactor, Bioremediation	Internet resource 38	LCD/ BB
29.	Biofertilizer, Bioenergy	RB9-Pg.219,286	LCD/ BB
30.	Biosensors, Biopolymers, Biofilters	TB4Pg.106-109, RB7 Pg. 181-200, 423-430, 281-287	LCD/ BB
31.	Biochips, Microbial fuel cells in vehicles	RB7 Pg. 435-438, RB8 Pg. 221-222	LCD/ BB
32.	Biotechnological reliance in space, agriculture and nuclear energy	Internet resource 23,24	LCD/ BB
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins

Sub. Code / Sub. Name: BT22101/Biology for Engineers

Unit : IV IMPACT OF MACHINE/DEVICES ON HUMAN (5 Hrs)

Unit Syllabus: Biological effects – Somatic and genetic effect, Exposure and health effects –microwaves, Radiation, radiofrequency and electronic gadgets, Man-made and Technological hazards, Impact on ecosystem - Chemical, nuclear, radiological, transportation and e-waste hazards.

Objective: To discuss the impact of the machine on human.

Session No *	Topics to be covered	Ref	Teaching Aids
33.	Biological effects – Somatic and genetic effect	RB4 Pg. 149-162	LCD/ BB
34.	Exposure and health effects –microwaves, Radiation, Radio frequency ,and electronic gadgets	Internet resource 1,2	LCD/ BB
35.	Man-made and Technological hazards	Internet resource 4	LCD/ BB
36.	Impact on ecosystem - Chemical, nuclear waste hazards, Impact on ecosystem – Radiological waste hazards	Internet resource 5,6	LCD/ BB
37.	Impact on ecosystem – Transportation waste hazards, Impact on ecosystem – e-waste hazards	Internet resource 5, 7	LCD/ BB
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins

Sub. Code / Sub. Name: BT22101/ Biology for Engineers

Unit : V REGULATIONS (8 Hrs)

Unit Syllabus: International and National regulatory bodies - Radiation in the electromagnetic spectrum, Electronic devices, Cell phones, Smart meters, Medical use of radiation and Nuclear power plants, Labeling Regulatory Requirements for Medical Devices, Ethics and privacy cameras and surveillance system, Regulation of Human Cloning and Embryonic Stem Cell Research, Privacy and ethical issues in 3D whole body scanning, Regulation of emerging gene technologies.

Objective: To understand the regulation and ethics.

Session No *	Topics to be covered	Ref	Teaching Aids
38.	International and National regulatory bodies	Internet resource 8,9	LCD/ BB
39.	Radiation in the electromagnetic spectrum	Internet resource 10	LCD/ BB
40.	Electronic devices, Cell phones, Smart meters	Internet resource 10	LCD/ BB
41.	Medical use of radiation and Nuclear power plants, Labeling Regulatory Requirements for Medical Devices	Internet resource 11,12	LCD/ BB
42.	Ethics and privacy cameras and surveillance system	Internet resource 13	LCD/ BB
43.	Regulation of Human Cloning and Embryonic Stem Cell Research	Internet resource 14	BLV 2
44.	Privacy and ethical issues in 3D whole body scanning	Internet resource 15	LCD/ BB
45.	Regulation of emerging gene technologies.	Internet resource 16	LCD/ BB
Content beyond syllabus covered (if any): NIL			

* Session duration: 50 mins

Sub Code / Sub Name: BT22101/Biology for Engineers

TEXT BOOKS (TB):

1. Johnson, A. T. Biology for engineers. CRC Press, 2011.
2. Vaccari, D. A., Strom, P. F., &Alleman, J. E. Environmental biology for engineers and scientists (Vol. 7, p. 242). New York: Wiley-Interscience, 2006.
3. Waite, G. N., & Waite, L. R. Applied cell and molecular biology for engineers.McGraw-Hill Education, 2007.
4. Khandpur, R. S. Biomedical instrumentation: Technology and applications (Vol.1). New York: Mcgraw-hill, 2005.
5. Salvendy, G. (Ed.). Handbook of human factors and ergonomics. John Wiley & Sons, 2012.
6. George C. Kagadis& Steve G. Lange. Informatics in Medical Imaging (Imaging in Medical Diagnosis and Therapy), CRC Press, 2012.

REFERENCE BOOKS (RB):

1. Nelson, D. L., Lehninger, A. L., & Cox, M. M. Lehninger principles ofbiochemistry. Macmillan, 2008.
2. Subrahmanyam, S. A Textbook of Human Physiology. S. Chand Limited, 1987.
3. Kindt, T. J., Goldsby, R. A., Osborne, B. A., &Kuby, J. Kuby immunology.
4. Suraishkumar, G. K., Biology for Engineers. Oxford University Press, 2019.
5. Bio-Inspired Sensory Systems: Using Natural, Photo-, Mechano-, and Chemo-Sensory Systems for Design Inspiration, Geoffrey Brooks, Florida State University Panama City
6. Colin Ratledge and Bjorn Kristiansen, Basic Biotechnology. Cambridge University Press, 2013
7. Varsha Gupta, Manjistha Sengupta & Jaya Prakash, Basic and Applied Aspects of Biotechnology. Springer, 2017
8. Sawai, H. ed., 2011. Biological functions for information and communication technologies: theory and inspiration (Vol. 320). Springer.
9. 3. Wulf Cruger and Anneliese crueger"Biotechnology:a text book of industrial Microbiology", panima publishing corporation, 2017

INTERNET RESOURCES

1. https://documents.manchester.ac.uk/display.aspx?DocID=26898
2. https://www.researchgate.net/publication/335149101
3. https://www.tandfonline.com/doi/full/10.1080/15980316.2014.947389
4. https://www.fema.gov/pdf/areyouready/technohazards.pdf
5. https://blog.idrenvironmental.com/how-hazardous-waste-disposal-affects-the-environment
6. https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull31-4/31404682831.pdf
7. https://transportgeography.org/contents/chapter4/transportation-and-environment/
8. https://www.oecd.org/gov/regulatory-policy/44925979.pdf
9. https://www.pda.org/scientific-and-regulatory-affairs/regulatory-resources/global-regulatory-authority-websites

10. https://www.cancer.org/healthy/cancer-causes/radiation-exposure/smart-meters.html
11. https://energy.ec.europa.eu/topics/nuclear-energy/radiological-and-nuclear-technology-health/medical-uses-radiation_en
12. https://www.fda.gov/medical-devices/overview-device-regulation/device-labeling
13. https://iep.utm.edu/surv-eth/
14. https://www.cmaj.ca/content/cmaj/170/7/1086.2.full.pdf
15. https://www.researchgate.net/publication/261160324_3D_body_scanning_technology_Privacy_and_ethical_issues
16. https://pubmed.ncbi.nlm.nih.gov/30079105/
17. https://www.researchgate.net/publication/287380886_Human_Motion_Capture_System_and_its_Sensor_Analysis
18. https://levity.ai/blog/human-in-the-loop
19. https://www.researchgate.net/publication/337104214
20. https://en.wikipedia.org/wiki/Biocybernetics#
21. https://elib.uni-stuttgart.de/bitstream/11682/7195/1/nag32.pdf
22. https://www.aalto.fi/en/department-of-electrical-engineering-and-automation/bionic-and-rehabilitation-engineering
23. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8516993/
24. https://www.mdpi.com/2071-1050/4/6/1173
25. https://my.clevelandclinic.org/health/diagnostics/10123-pet-scan
26. https://www.radiologyinfo.org/en/ultrasound
27. https://www.ultrasoundschoolsinfo.com/whats-the-difference-between-ultrasounds-and-x-rays/
28. https://www.radiologyinfo.org/en/info/pet
29. https://www.ultrasoundschoolsinfo.com/whats-the-difference-between-ultrasounds-and-x-rays/
30. https://doi.org/10.1093/icb/icr016
31. https://www.mdpi.com/2412-3811/7/4/46
32. https://doi.org/10.1016/j.nantod.2021.101283
33. https://www.sciencedirect.com/science/article/pii/S1876610219312007?via%3Dihub
34. https://doi.org/10.3390/app11167514
35. https://pubs.rsc.org/en/content/articlelanding/2020/NA/D0NA00445F
36. https://www.sciencedirect.com/science/article/pii/S2405451816300484?via%3Dihub
37. https://www.dovepress.com/biomimetics-forecasting-the-future-of-science-engineering-and-medicine-peer-reviewed-fulltext-article-IJN
38. https://link.springer.com/chapter/10.1007/978-3-031-08830-8_1

BLENDED LEARNING VIDEOS (BLV):

1. https://youtu.be/w8Pa-R9wxS4
2. https://youtu.be/xGbXqqP3IPw

SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

	Prepared by	Approved by
Signature	N. Sathish	20/1/25
Name	Mr.N.Sathish	Prof. E. Nakkeeran
Designation	Assistant Professor	HOD - BIO
Date	09/01/2025	09/01/2025

Remarks *: If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD.