DEPARTMENT OF PHYSICS AND NANOTECHNOLOGY

SRM IST, KATTANKULATHUR

Subject Code : 18NTO301T

Subject Title: APPLICATIONS OF NANOTECHNOLOGY

Lesson Plan for Unit I

Duration (hour)		Topic	Reference
S1	SLO-1	Environmental pollutants in air	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter - 1
	SLO-2	Environmental pollutants in water	
S2	SLO-1	Environmental pollutants in soil	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter - 1
	SLO-2	Types of toxic and hazards wastes	
S3	SLO-1	Application of nanotechnology - Introduction	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7
	SLO-2	Application of nanotechnology in industrial waste	
S4	SLO-1	Application of nanotechnology in waste water treatment	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.2
	SLO-2	Drinking water purifications	
S-5	SLO-1	Air purifications	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.1
	SLO-2	Gas purifications	
S-6	SLO-1	Nano Monitoring	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.3
	SLO-2	Nano Biosensors - Overview	
S-7	SLO-1	Nano Biosensors for Pesticide Detection	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.3
	SLO-2	Nano Biosensors for Plant Pathogen Detection	
S-8	SLO-1	Nano Bioremediation	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.4
	SLO-2	Pesticide Degradation	
S-9	SLO-1	Soil Structure	Environmental Nanotechnology, M. H. Fulekar, Bhawana Pathak, Publisher- CRC Press: 2017: Chapter – 1.7.5
	SLO-2	Soil structure Remediation	

Lesson Plan for Unit II

Duration (hour)		Topic	Reference
S1	SLO-1	Nanotechnology in Agriculture	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Precision farming	
S2	SLO-1	Smart delivery system	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Nano fertilizers and types	
S3	SLO-1	Nano urea and mixed fertilizers	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Nano fertigation	
S4	SLO-1	Nano pesticides	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Nano-seed Science	
S-5	SLO-1	Nanotechnology in Food industry	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Nano packaging for enhanced shelf life	
S-6	SLO-1	Smart packaging	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Intelligent packaging	
S-7	SLO-1	Food processing	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Food safety	
S-8	SLO-1	bio-security	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	Electrochemical sensors	
S-9	SLO-1	sensors for food analysis	Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
	SLO-2	contaminant detection	

Lesson Plan for Unit III

Duration (hour)		Topic	Reference
S1	SLO-1	Electronic circuit chips	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Nanosensors and actuators	
S2	SLO-1	Optical switches	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Diodes	
S3	SLO-1	Nano-wire transistors	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Advantages of nano electrical and electronic devices	
S4	SLO-1	Memory storage	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Lighting displays and filters	
S-5	SLO-1	Quantum computers	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Medical diagnosis and conductive additives	
S-6	SLO-1	Lead-free solder	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Nano coatings and EMI shielding.	
S-7	SLO-1	Energy devices	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications

	SLO-2	Fuel cells	Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
S-8	SLO-1	role of nanomaterials in fuel cell applications	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Photovoltaic cells	
S-9	SLO-1	Application of nanotechnology in solar cells	Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.
	SLO-2	Application of power in transportation	

Lesson Plan for Unit IV

Duration (hour)		Topic	Reference
S1	SLO-1	Nanofibre production in Textiles	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Electrospinning	
S2	SLO-1	Controlling morphologies of nanofibers	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Nano-fillers embedded polypropylene fibers	
S3	SLO-1	Bionics	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Swim-suits with shark-skin effect	
S4	SLO-1	Soil repellence	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Lotus effect	
S-5	SLO-1	Nano finishing in textile	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Modern textiles Nanopolymers in medical textiles	
S-6	SLO-1	Introduction to cosmetics	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology
	SLO-2	Formulation of Gels	

			in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
S-7	SLO-1	Shampoos	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Hair-conditioners	
S-8	SLO-1	Introduction to Sun-screen dispersions	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Sun-screen dispersions for UV protection	
S-9	SLO-1	Colour cosmetics	P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
	SLO-2	Types of Colour cosmetics	

Lesson Plan for Unit V

Duration (hour)		Topic	Reference
S1	SLO-1	Introduction to biomedical applications	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Bioreceptors and their properties	
S2	SLO-1	Biochips	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Integrated nanosensor	
S3	SLO-1	DNA based biosensors	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Natural nanocomposite systems	
S4	SLO-1	Nanomaterials in bone substitutes and dentistry	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Implants and Prosthesis	
S-5	SLO-1	Tissue Engineering	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Neuroscience	
S-6	SLO-1	Neuro-electronic Interfaces	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Nanorobotics	
S-7	SLO-1	Photodynamic Therapy	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Protein Engineering	
S-8	SLO-1	Nanosensors in Diagnosis	Neelina. H, Malsch (Ed.),

	SLO-2	Drug delivery	"Biomedical Nanotechnology", CRC Press 2005.
S-9	SLO-1	Cancer therapy	Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
	SLO-2	Other therapeutic applications	

Text Book for study

1. Environmental Nanotechnology, by M. H. Fulekar, Bhawana Pathak
2. Lynn J. Frewer, Willehm Norde, R. H. Fischer and W. H. Kampers, Nanotechnology in the Agri-food sector, Wiley-VCH Verlag, (2011).
3. Jennifer Kuzma and Peter VerHage, Nanotechnology in agriculture and food production, Woodrow Wilson International Center, (2006).
4. P. J. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead Publishing Limited,Cambridge, (2007).
5. Neelina. H, Malsch (Ed.), "Biomedical Nanotechnology", CRC Press 2005.
6. Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications
Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, Cambridge University Press, 2008.