ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

MANGALORE UNIVERSITY

(Accredited by NAAC with 'A' Grade)

ಕ್ರಮಾಂಕ/ No. : MU/ACC/CR.22/2022-23/A2

ಕುಲಸಚಿವರ ಕಛೇರಿ
ಮಂಗಳಗಂಗೋತ್ರಿ – 574 199
Office of the Registrar
Mangalagangothri – 574 199
ದಿನಾಂಕ/Date:18.10.2022

NOTIFICATION

Sub: Implementation of New Soft Core courses in M.Sc. Materials Science programme.

Ref: Academic Council approval vide agenda No.: ಎಸಿಸಿ:ಶೈ.ಸಾ.ಸ.2:22 (2022–23) dtd 27.09.2022

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Implementation of New Soft Core courses MSS 511: Sustainable Biopolymer Materials and MSS 559: Recycling of Polymers in M.Sc. Materials Science programme which has been approved by the Academic Council at its meeting held on 27.09.2022 is hereby notified for implementation with effect from the academic year 2022-23.

Copy of the Syllabus shall be downloaded from the University Website (www.mangaloreuniversity.ac.in)

REGISTRAR

To

1. The Chairman, P.G. BOS in Materials Science, Mangalore University.
2. The Chairman, Dept. of Materials Science, Mangalore University.
3. The Registrar (Evaluation), Mangalore University.
4. The Superintendent (ACC), O/o the Registrar, Mangalore University.
5. The Asst. Registrar (ACC), O/o the Registrar, Mangalore University.
6. The Director, DUIMS, Mangalore University – with a request to publish in the website
7. Guard File.

MSS 559: Recycling of Polymers (3 Credits)

Unit I

Polymer recycling- the need for recycling, source of plastic waste; Depolymerization - Thermal depolymerization – Ceiling temperature and its importance – Degradation – Biodegradation, Primary, Secondary and Tertiary recycling - Sorting and separation techniques – Density based – Optical sorting – Electrostatic sorting – Sorting by melting temperature – Sorting by selective dissolution- sorting of metal contaminants, size reduction - cutting – Densification – Pulverization – Chemical methods, melt filtration of contamination in recycled plastics – screen changers – filtration requirements of different recycled plastics.

14h

UNIT II

Recycling of Engineering Thermoplastics – Polyethylene (HDPE, LDPE), Polystyrene, Nylon, Polycarbonate, Polyethylene terephthalate, Recycling of PVC, Energy recovery – applications. Recycling of polyurethanes – Physical methods – Chemical methods, Feed stock recycling and energy recovery. Depolymerization of PMMA. 14h

Unit III

Hydrogenation of plastics waste – Gasification – different gasification process – economic aspects – Incineration of plastic waste, Energy recovery.

Rubber recycling - Tyre size reduction – Application of ground Rubber crumb – Filler – Bound Rubber products – Thermoplastics binder – Surface treated crumb rubber – applications – Rubber reclaiming and de-vulcanization of scrap rubber and fuel source. 14h

References

1. Recycling of Polymers: Methods, Characterization and Applications, Raju Francis, Wiley, 2016
2. Plastics Wastes: Management Control, Recycling and Disposal, R. T. Curlec and S. Das, US Environmental Protection Agency, Noyes Data Corporation, 1991
3. Degradable Polymers, Recycling and Plastics, A. C. Albertson and S. J Huang, Marcel Dekker Inc, 1995
4. Emerging Technologies in Plastics Recycling, G. D Andrews and P. M. Subramanian, ACS Symposium Series, 513, 1992
5. Polymer Recycling Science, Technology and Applications, J. Scheirs, John Wiley & Sons, 1998
6. Plastics Waste Management Disposal Recycling and Reuse, N. Mustafa, Marcel Dekker Inc, 1993
7. Plastics Technology, Midhat Luqman, CBS Publishers & Distributors Pvt Ltd New Delhi, 2013
8. Rubber Technology and Manufacture, 2nd edition, C. M. Blow, C. Hepburn Butterworths, London,

MSS 511: Sustainable Biopolymer Materials (3 Credits)

Unit I

Natural Polymers– Introduction, Classification, Structure, Mechanical and Physico-chemical properties; Materials prepared from –cotton, wool, silk, rubber, collagen, hyaluronan-melanin, lignin – properties and applications, Engineering applications of wood and bamboo; Monomers and polymers from renewable resource materials- castor oil, natural gums, oleo chemicals, cashew nut shell liquid, carbohydrate derived monomers. 14h

Unit II

Starch filled plastic – thermoplastic starch – starch based materials in the market – other additives for biodegradation, Agricultural plastics – Packaging plastics; Fibers- classification and general properties, essential properties of fiber forming polymers- cotton fiber, bast fiber, protein fiber, regenerated fiber, high-performance fiber – developments in bamboo fiber technology.

Polymers for biomedical applications– Polymers in dentistry – Tissue adhesives – Dialysis membrane – Blood oxygenators – Bone cement – Prostheses – Biodegradable sutures – Controlled drug delivery systems. 14h

Unit III

Biodegradation of polymers- Introduction – modes of biological degradation – enzymatic degradation of biopolymers - polysaccharides, proteins, nucleic acids; synthetic biodegradable polymers - polycaprolactone- modified polycaprolactone copolymer with ester, amide and urethane linkages, polyglycolate, biodegradable polyamides –copolymers of - amino acid -glycine, serine, aminocaproic acid; polyglutamic acid, bacterial polyesters, Control of bio-degradation by means of antioxidants. 14h

References

1. Chemistry and Technology of Biodegradable Polymers, G. J. L. Griffin, Blackie Academic Professional, 1994
2. Handbook of Biodegradable polymers , A. J. Domb, J. Kost & D. M. Wiseman, CRC Press, London, 2019
3. Degradable Polymers – Principles & Applications, Gerald Scatt & Dan Gilad, Chapman & Hall, 1995
4. Polymer Photodegradation – Mechanism and experimental methods, J.F. Rabek, Springer, 1995
5. Fiber science and technology, Akira Nakamura, Oxford & IBH Publishing Co. Pvt Ltd, New Delhi, 1980
6. Handbook of Pulp and Paper Technology, Kenneth W Britt, CBS publishers and distributors, New Delhi, 2004
7. Biomaterials, Sujata V Bhat, 3rd edition, Narosa Publishing House Pvt Ltd New Delhi, 2017