



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

NATIONAL EDUCATION POLICY

GENERAL ELECTIVE FOR UG

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
GUPH601	GE	Advanced Characterization methods for Nanomaterials	60	20	20	0	0	4	0	0	4

Course Objectives	<ol style="list-style-type: none"> To develop the comprehensive understanding of advanced characterization methods for Nanomaterials and ability to apply them to a particular nanomaterial and laying the foundation for research and development. To work ethically as member as well as leader in a diverse team.
Course Outcomes	<ol style="list-style-type: none"> Student will be able to understand and solve the problems related to characterization of Nanomaterials. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Abbreviation		Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).
Th	Theory	
T	Tutorial	Teacher Assessment (Practical) shall be based on following components: Viva / File / Participation in Lab work (Given that no component shall be exceed 50% of Marks).
P	Practical	

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GUPH601: Advanced Characterization methods for Nanomaterials

UNIT I: Basic of Nanoscience Background to nanoscience, Nanomaterials in Different Configurations: 3D, 2D, 1D & 0D Materials, surface to volume ratio, Synthesis of Nanomaterials: Hydrothermal, Sol-Gel Method, Resistive heating and Electron beam deposition, Sputtering

UNIT II: X-ray/ Synchrotron based Spectroscopy techniques: powder X-ray diffraction, glancing angle X-ray diffraction, X-ray fluorescence, X-ray photo-electron spectroscopy, X-ray absorption fine structure

UNIT III: Optical characterization techniques: RAMAN spectroscopy, UV-visible spectroscopy, FT-IR spectroscopy, Photoluminescence, Ionoluminescence

UNIT IV: Microscopic Techniques Optical microscopy, scanning tunneling microscopy, scanning electron microscopy, transmission electron microscopy

UNIT V: Magnetic characterization: Superconducting quantum interference device magnetometry (SQUID), Vibrating sample magnetometry (VSM), Mössbauer spectroscopy

REFERENCES

1. Essentials in nanoscience and nanotechnology, Narendra Kumar, Sunita Kumbhat., 2016, John Wiley & Sons
2. Scanning Electron Microscopy, Ludwig Reimer, 1998, Springer
3. MODERN SPECTROSCOPY, J. Michael Hollas, 2004, WILEY
4. Luminescence: From Theory to Applications, Cees Ronda, 2008, WILEY
5. Magnetic Characterization Techniques for Nanomaterials, Challa S.S.R. Kumar, 2018, Springer