Table. NOS Topics in The Course

Course	Rationale & Essence for NOS Categorization	Key NOS Aspects Addressed
Physics Learning Problems	This course is categorized under NOS because it addresses the fundamental epistemological challenges in learning physics, revealing how students construct scientific knowledge differently from everyday thinking; its essence lies in bridging the gap between how science is practiced by scientists and how it is understood by learners, thereby making explicit the cognitive processes involved in acquiring scientific literacy and focusing on why certain concepts are inherently difficult due to the very nature of scientific knowledge itself.	1. Conceptual Change 2. Theory-Laden Observation & Reasoning 3. Nature of Scientific Models
Physics Teacher Professional Development	The rationale for its NOS categorization is that sustainable professional development requires teachers to become reflective practitioners who understand not only *what* to teach but *why* certain pedagogical approaches work from a scientific standpoint, with the essence being the transformation of teachers from passive transmitters of facts into critical inquirers who systematically examine and improve their teaching practices using evidence-based approaches, thereby mirroring the self-correcting and collaborative nature of the scientific enterprise.	1. Evidence-Based Practice 2. Science as a Social Enterprise 3. Reflective Skepticism
Literacy in Physics Learning	This course belongs to NOS because scientific literacy represents the ultimate goal of understanding the nature of science—to produce individuals who can think and act scientifically—with its essence being to move beyond content knowledge and focus on developing students' capacity to evaluate scientific claims, distinguish science from pseudoscience, and understand science as a dynamic way of knowing and engaging with the world, rather than just a static body of facts.	1. Critical Evaluation of Evidence 2. Science-Society-Technology Relationship 3. Scientific Habits of Mind
Science Lab Management for Sustainable Learning	It is categorized under NOS because the science laboratory serves as the primary environment where the tenets of NOS are experienced first-hand, and its essence is to transform the lab from a place for mere verification of facts into an authentic environment for genuine investigation, where students directly encounter the empirical, creative, and uncertain nature of scientific work within the critical context of real-world sustainability issues.	1. Empirical Basis of Science 2. Scientific Inquiry as a Practice 3. Socio-Scientific Issues (SSI)

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History of Physics Development	Serves as the foundational NOS course by chronicling the evolution of scientific ideas, demonstrating that knowledge is not static but evolves through evidence and paradigm shifts.	1. Tentativeness of scientific knowledge 2. Sociocultural embeddedness of science 3. Role of revolution (paradigm shifts) in scientific progress
Physics Misconceptions and Remediation	Focuses on the epistemology of learning, showing how correct scientific knowledge is built in the mind by replacing intuitive, often incorrect, beliefs through empirical evidence and critical experiments.	1. Empirical basis of science 2. Theory-laden observation and interpretation 3. Science as a process of correction and revision
Educational Research Methodology	Teaches the "NOS of education," emphasizing that claims about effective teaching must be based on systematic, empirical inquiry rather than tradition or opinion, mirroring scientific methods.	1. Science as a systematic method of inquiry 2. Function of theory in guiding research 3. Human and social dimensions (ethics, limitations)
Review of Physics Education Research Findings	Trains students to be critical consumers of scientific literature in education, developing skills to evaluate the validity, reliability, and claims of research studies.	1. Critical evaluation of evidence and arguments 2. Understanding the peer-review process 3. Tentativeness of knowledge in a growing field
Earth and Space Science (IPBA)	Uniquely highlights how science operates when phenomena are unobservable. Knowledge is built through inference, modeling, and indirect evidence, emphasizing the creative and interpretive nature of science.	1. Role of models and inference in science 2. Difference between observation and inference 3. Creative and imaginative nature of scientific knowledge