

Paper Code	NHPY-110	Cr. Hrs.	03
Paper Title	WHAT IS SCIENCE?		
Domain	Natural Sciences		

Course Introduction		
<p>This course introduces various fields of natural science, how scientists operate within these fields, what methods they deploy to make new discoveries, and how they communicate the advances in their fields to the world.</p> <p>The course starts with an introduction to logic and the development of scientific approach. It discusses the modern use of the scientific method and the tools that scientists deploy to ensure that they produce authentic knowledge. Students are then introduced to the main branches of science including physics, chemistry and biology, their core underlying principles, major developments in these fields and their applications in modern life. Students will work on case studies to understand how scientists discover various workings of nature and check errors if these arise in their work.</p> <p>The final part of the course focuses on the skills to separate valid science from pseudoscience. Students are also exposed to the fundamentals of science communication and strategies to identify reliable bodies of knowledge.</p>		
Learning Outcomes		
<p>On the completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. Clearly articulate the development of scientific thought through various parts of human history and compare it to the modern scientific method. 2. Describe various branches of science, their underlying core ideas, and compare their applications. 3. Using case studies and demonstrations, practice application of the scientific method in the natural sciences. 4. Determine whether a given claim or belief is scientifically valid or not, and provide a clear rationale for doing so. 		
Course Content		Assignments/Readings
Week1	Logic	Chalmers 4 th ed, p.39-40
	Explanation: hypothetic deductive method	Carey 4 th ed., p.3-5, p.29-36
Week2	Observations, predictions and determinism	Carey, p.9-17, 36-37
	Inductive reason	Chalmers chapter 4
Week3	Objectivity and universality; using instruments	Carey p.9-17, p.69-71
	Aim of science: find testable and tested explanations, predictability	Chalmers ch.5
Week4	Inquiry about natural world in antiquity	HECTM week 2
	Science in the medieval era: China, South Asia	HECTM week 3
Week5	Science in the Muslim middle east	HECTM week 3
	Science in the Medieval Europe	HECTM week 4

Week6	ScienceinearlyModernEurope	HECTMweek4
	Modernscience:Sciencechangeandextended theories	Hawkings,chapter3(first3pages)
Week7	Facts,models,lawsandtheories	Chalmers,p.1-5,9-14,Gordonp.106-110,Careyp.38-39, Hawkings, chapter 3(first3pages),Chalmers p.97-100
	Physicsanditssub-branches	HECTMweek6
Week8	ClassicalPhysics	HECTMweek7
	ModernPhysics	HECTMweek8
Week9	Chemistryanditssub-branches	HECTMweek6
	Chemistry	HECTMweek9
Week10	Earthscience-I	HECTMweek10
	Earthscience-II	HECTMweek10
Week11	Biologyanditssubbranches	HECTMweek6
	Biology	HECTMweek11
Week12	Evolution	HECTMweek11
	Naturalselection	HECTMweek11
Week13	Cellsinbiology	HECTMweek12
	Genes,DNAandRNA	HECTMweek12
Week14	PhotosynthesisandEcosystem	HECTMweek12
	Scalesandlevelsinbiology,levelsof reality	HECTM week 12Chalmers,p.264-266
Week15	Fallaciesinthenameofscience	HECTM week 13Carey,chapter6
	Pseudoscience	HECTM week 14Carey,p.123-128
Week16	Sciencecommunication,Sciencejournals	HECTMweek15
	Pureandappliedscience,useofscience,roleof valuesinscience	Carey, p.5-7, Cartwright,p.162-166

TextbooksandReadingMaterial

1. Textbooks:

- a) *“WhatisThisThingCalledScience?”*byA.F.Chalmers.Publisher:UQP.4thed.2012.
- b) *“ABeginner’sGuidetotheScientificMethod”*byS.S.Carey,Wadsworth,4thed.2011.
- c) HECTeacher’sManual(NaturalSciences)for“WhatisScience?”,2021.

2. SuggestedReadings

- *“ABrieferHistoryofTime”*byS.HawkingandL.Mlodinow,BantamBooks,2005.
- *“TheHistoryandPhilosophyofSocialScience”*byGordon,S.Routledge,1991.

- “Philosophy of Social Science”, Cartwright, N and Montuschi, E. (Ed.), Oxford University Press, 2014.

Teaching Learning Strategies

1. Asking students for what they have learnt and what do they think
2. Group activities
3. Using video resources
4. Readings suggested readings
5. Essay writing

Assignments: Types and Number with Calendar

Assessment

Sr.No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess the students based on term paper, research proposal development, field work and report writing etc.