

**ONE YEAR POST GRADUATE DIPLOMA PROGRAMME  
IN  
SCIENCE COMMUNICATION**



**School of Journalism and Mass Communication**



**Aryabhata Knowledge University**

**SYLLABUS**

## **P.G. Diploma in Science Communication**

### **Objectives of the course / paper**

Science Communication plays a vital role in the social development of a society. However, the Indian newspapers, magazines, television and film industry have been lacking in Science coverage and mostly depend on entertainment and commercial aspects. Science communication plays an instrumental role in bringing about a change in society in one way or the other. By telling a story on scientific development through films or featuring environmental and health issues through newspapers or magazines in simple language with effective presentation subtly impact the people and aid in nurturing scientific temper. Scientific facts and findings can be presented through a combination of history, heritage, literature and art to make the communication more suitable for layman, fellow citizens.

The Science Communication course has been started with the aim and objective to produce professionals in the area of science communication, science journalism (reporting and writing), science filmmaking, public relations on science, health and environmental issues and related communication fields to bridge the gap between science and society and to promote scientific temper in societies. One of the major objectives of these courses is to orient students in science communication skills required to cover new researches, developments and scientific initiatives in the field of science, technology, health and environment. Issues like natural disasters, weather forecasting, space research, biotechnology breakthroughs, new researches on agriculture, forensic science, marine science, climate change and pollution need regular media attention.

The broad objectives of the science communication course are to impart the basic science communication skills and techniques to communicate effectively through various media platforms. This course is designed for media students to simulate scientific outlook, to update knowledge and competency in various functional areas of science communication, to learn science news reporting and writing, to provide understanding of science outreach in R&D centres, corporate houses and media industry and to provide students hands-on experience in critical areas of science communication.

### **Learning Outcomes**

The Science communication course is designed with the theoretical and practical aspects of science communication to orient students to become

successful communicators in the fields of Science & Technology, health and environment. Students learn about the needs, significance and role of S&T communication, emergence of modern science, landmark achievements of great scientists and science journalism in India. Reporting, editing, writing on scientific issues, science and technology related editorial practices, various types and styles of science writing, scientoons etc. are included in the science communication course.

Fastest growing careers in scientific / environmental / medical communication in media industry, PR agencies, NGO sector, government institutions and international organisations are available for those science graduates who have a passion to communicate science to the public. One should have a flair for writing and speaking; and should be aspiring to become a science journalist, science writer, science film maker, public relation officer or corporate communicator in the field of science & technology, health, environment, agriculture, IT, energy and related sectors. He/she can opt for an attractive career in the field of science communication.

Science communication is an emerging field which offers variety of job opportunities to students in print and electronic media (as a science journalist, editor, writer or science film maker), corporate world (as a public relation officer), science museums or science centres (as a curator or science communicator), social sector, NGOs, research and development sector (as scientist or science communicator). Science communicators are getting attractive jobs in PR agencies, corporate houses, national & international NGOs and other organizations working in the area of science, technology, environment, health, agriculture, rural and development communication. Students may establish their own production house for production of science films. Increasing the public understanding of science creates an intelligent, informed and skilled group of people who will act as an extremely valuable resource for society.

Government organisations, PSUs, science laboratories, R&D centres, science museums and science centres are also offering the jobs of Education Officer, Scientist (science communication) and Public Relation Officer. At present many students from these courses are successfully placed in various government institutions including NPCIL, Mumbai; DST, Govt. of India; Ministry of Earth Sciences; various television news channels, news agencies, print media, web portal services and international organisations.

## Outline

India started emphasizing the notion of 'scientific temper' in the 1940s, much before science communication became a buzzword internationally. India was the first country to pass a science policy resolution and amend its constitution to include spreading of 'scientific temper' in the list of citizens' duties. We see rationality as an essential ingredient for material and moral development. In fact, some scholars aver that the concept of scientific temper has existed for a long time, tracing it back to the time of Buddha, who preached tolerance and gave a message against superstition and dogma.

*Arthashastra* of Kautilya is a strong advocate of the use of reason in public affairs, holding that the “study of critical inquiry is always thought of as a lamp for all branches of knowledge, a means in all activities, and a support for all religious and social duty”. It is unambiguous in placing reason and critical inquiry above other considerations. Kautilya says “Investigating by means of reasons, good and evil in the religion, profit and loss in the field of trade and agriculture, and prudent and imprudent policy in political administration, as well as their relative strengths and weaknesses, the study of critical inquiry (anvikshiki) confers benefit on people, keeps their minds steady in adversity and in prosperity, and produces adeptness of understanding, speech and action.”

The Constitution of India unanimously echoes this ethos. Section V of our Constitution, Article 51A on ‘Fundamental Duties’ begins by saying: “It shall be the duty of every citizen of India...”. In the enumeration of such duties, sub-clause (h) says: “To develop the scientific temper, humanism and the spirit of inquiry and reform”. Scientific temper encompasses rationality, rights, and responsibility in equal measure. The iconic poem of Rabindranath Tagore “Where knowledge is free; Where the world has not been broken up into fragments by narrow domestic walls” echoes these values.

Thus, it is the duty of every citizen of India to inculcate scientific temper; and media must play a leading role in nurturing and tempering the citizens. Science films and reporting made in simple but appealing manner highlighting on issues on science, technology, environment, health and hygiene among other things are the need of the hour.

This course will broadly cover the following sub-themes of science communication:

- Differences between popular perceptions and practitioner's views of science; Why report science?
- Science Communication: Why & How; Institutional Efforts of Science Communication in India;
- Common Ground between scientists and media professionals;
- Dealing with scientist and scientific content, Nature of communication between scientists, between innovators;
- Primary, secondary, tertiary sources in Science, Technology;
- Problems in popularising and reporting science, ways to overcome the challenges;
- Covering Technology: Problems and solutions; How to write effective popular science articles?;
- Search and Research for content: Search Engines. Demonstration of methods and techniques;
- Difference between Information, Education and Communication;
- Content and Structure, Story telling, Functions or elements of folk tales; Popular science writing and rewriting, and editing, KISS principle, 5Ws and H, Some dogmas in media and communication, Structure of words, sentences, paragraphs, Shift focus from keywords to commonly used words; Why report science and related topics, International, National, State, Local perspectives, PR Practices & Science Communication;
- Science Films and Science Broadcast, Script writing for documentary films and video spots on science, Science programmes for radio: conceptualization to broadcast; Sciencetoon – effective tool of science communication.

### **Significance and Scope of the course**

Science communication course has been designed to develop a team of professionally trained science communicators, science film-makers, writers and journalists who can take-up the challenge of processing the information on science and technology and present them in such a manner that it is educating as well as entertaining to the common man. Increasing popularity of science channels such as “Discovery” or “National Geographic” has proved that if stories on science and technology are packaged and presented intelligently and skilfully, it can definitely command attention of the common man from the clutter of entertainment programmes.

Science communication can be important, not just to communicate scientific information but maintain a demand for ongoing science and create a audiences' feedback mechanism to check the communication processes that information is relevant, interesting and useful for target groups or not. Some information in science and technology is directly applicable, so science communicator must be careful about the content to be communicated to target groups. For example if we are communicating "tissue culture" to farmers, we must explain 5Ws & 1H - "What", "Why", "Where", "When", "to Whom" and "How" of tissue culture.

Our scientists are celebrating the evidences of Higgs Boson in Large Hadron Collider experiment, we have launched our successful space missions including South Asia Satellite for SAARC countries including many achievements on space science. The big challenge in front of science communicators is to make science communication more interesting and interactive. In this connection Prof. Yash Pal, one of the well-known science communicator and renowned scientists says: "It is true that a lot is done to promote scientific knowledge in our country, but it is not enough. The "scientific awareness" spreading process must take place first and foremost by contextualising the data and knowledge into the needs of everyday life. We have to make our communication more interesting and interactive. I have been making television series and communication magazines for some time, but I only recently discovered that the real challenge lies in children. The Children Science Congress has taught me what it means to tell people something starting from their daily experiences".

There is an ever-increasing need for scientific and technological information to be made available to various target groups. During the 100th session of Indian Science Congress in 2013, noted Agriculture Scientist Prof. M.S. Swaminathan suggested in his address- "Our Universities should help in developing science communicators who can explain to the general public in local languages the significance of important scientific discoveries. Similarly issues of biodiversity, biotechnology, nuclear technology and nano-technology need priority attention in efforts designed to bridge the scientist-society perception gap". Science communication is now established as a well-recognized discipline of higher education in Indian Universities.

The Science Communication course is designed for those students who are interested to report or write current issues of science, technology, environment or health, who think that *aam aadmi* (citizens) want to know the answers to questions such as: Are mobile phones safe to use? How radiation is harmful and useful? Why India is looking for genetically modified mustard cultivation? Why antibiotics are ineffective now? What constitutes a healthy diet? Should I

immunise my child? What is global warming? What is Large Hadron Collider? How nuclear energy is safe or unsafe? These issues may be critical in the context of scientific misinformation and they can easily be misinterpreted by the readers or viewers if communicated without proper homework by the filmmaker, reporter or writer. We now live in a world where access to useful, convenient and intelligible science information in the form of news, editorials and many other forms is becoming necessary in the day-to-day lives of the general public.

This course will acquaint the students with different aspects of science communication including science reporting, popular science writing and science communication through audio-visual media.

## **Semester – I**

### **Introduction to Science Communication**

**Course Code:** CC-1

**Credit:** 5

**Contact hours:** 5hrs/week

#### **Objectives:**

- To understand the basic concepts of Science Communication
- To familiarize with history of Science Communication and Science Journalism in India
- To know about institutions, events and prospects of Science Communication

**Unit 1:** Definition, History of Science communication / Science Journalism in India. Scientific temperament.

**Unit 2:** Role of media in public awareness of Science. Growth of science journalism, Obstacles in the field of science journalism and public perception of science.

**Unit 3:** Institutions involved in Science Communication in India (Vigyan Prasar, National Council of Science & Technology Communication, National Council of Science Museums, CSIR-NISCAIR).

**Unit 4:** Science Communication Events – National and International Science Films Festival of India; National Children Science Congress; India International Science Festival; Indian Science Congress; Indian Science Communication Congress.

**Unit 5:** Science communication on UN's Sustainable Development Goal

## **Understanding of Science Communication**

**Course Code:** CC -2

**Credit:** 5

Contact hours: 5hrs/week

### **Objectives:**

- To understand the basics of Science content
- To understand the difference between science and technology
- To develop skills of science writing

**Unit 1:** Dealing with scientist and scientific content; Nature of communication between scientists, between innovators

**Unit 2:** Primary, secondary, tertiary sources in Science, Technology; Structure of scientific papers and patents; Problems in popularising and reporting science, ways to overcome the challenges, Distinction between science and technology; Covering Technology: Problems and solutions

**Unit3:** What and why to report science? How to write effective popular science articles? Content areas for science writing: meeting the information needs of target audiences

**Unit 4:** Covering Health, Agriculture, Environment; Social responsibility – accuracy in reporting science and related topics.

**Unit 5:** Search and Research for content: Search Engines. Editorial practices for Science Communication: Down to Earth approach; Popular science writing & editing (including hands on / practical) Skills of popular science writing.

## **Models of Science Communication**

**Course Code:** CC-3

**Credit:** 5

Contact hours: 5hrs/week

### **Objectives:**

- To make students aware of the various models of Science Communication
- To familiarize students about public engagement with science and technology



**Unit I:** SCOT: the social construction of technology; Politics of Technology; Deficit Model of Public Understanding of Science.

**Unit II:** Public Participation, Dialogue and Engagement, Public Engagement with Science and Technology, critical exploration of the historical development of public engagement with science and technology by evaluating the differences between the deficit and dialogue models of public understanding of science. Public Engagement typologies including Communication, Consultation and Participation.

**Unit III:** Demonstrate critical awareness of different scientific disciplines' relationships to and interaction with public groups in order to understand how public is a dynamic and contingent category of science communication.

**Unit IV:** Tracing the shift from Public Understanding of Science (PUS) to Public Engagement with Science and Technology (PEST).

## **Reporting Science and Technology**

**Course Code:** CC-4

**Credit:** 5

Contact hours: 5hrs/week

### **Objectives:**

- To make students aware of scope of science reporting
- To familiarize students with different forms of science reporting
- To create an understanding of ethics in science reporting

**Unit I:** Scope of science reporting in India with reference to scientists and their inventions/discoveries. Science Reporting of Seminars, Conferences, Lectures, Science fairs, Exhibitions, Workshops, Scientific tour.

**Unit II:** Science reporting from labs.

**Unit III:** Science reporting / live coverage from ground zero (for land slide, earthquake, floods, and other natural and manmade calamities).

**Unit IV:** Special reporting of astronomical events like solar eclipse and space missions of ISRO. Discovery of Solar System objects and their properties, development of telescope technology – from Galileo’s first telescope to modern large and space telescopes.

**Unit V:** Ethics in science reporting.

## **Semester – II**

### **Mass Media and Agriculture Extension**

**Course Code:** CC-5

**Credit:** 5

Contact hours: 5hrs/week

#### **Objectives:**

- To understand agriculture reporting
- To understand the scope and importance of agro-journalism
- To understand newer aspects of agriculture, farming and biotechnology

**Unit I:** Agricultural media reporting, Analytical stories in advanced agricultural techniques: Horticulture, Apiculture, Sericulture, Fisheries etc.

**Unit II:** Government initiatives, scope and importance of agro-journalism; Reporting of success stories from rural areas / agriculture fields.

**Unit III:** Reporting / writing on grassroot level innovations by farmers / rural farmers (with reference to National Innovation Foundation India). Coverage of new agriculture technologies and activities of Krishi Vigyan Kendras. Indian farmers awarded by Padma awards

**Unit IV:** Reporting on issues related to Biotechnology - Genetic engineered crops: BT Cotton, BT Mustard, BT Brinjal etc., Tissue Culture, Green revolution.

**Unit V:** Smart Agriculture (Internet of things, drip irrigation, use of drone in agriculture). Organic farming.

## **Science communication on environmental and other global issues**

**Course Code:** CC-6

**Credit:** 5

Contact hours: 5hrs/week

### **Objectives:**

- To develop skills of environmental writing and reporting
- To explore the various aspects of global warming, climate change etc
- To explore various areas of science

**Unit I:** Environmental writing and reporting- e-waste management, 3-R policy. Green chemistry. Plastic and other pollution.

**Unit II:** Global Warming; Extreme weather patterns and phenomena.

**Unit III:** Climate change, influence of climate change on extinction of species.

**Unit IV:** Geoscience- Role of plate tectonic, Anatomy of mountain belt etc.

**Unit V:** Science Mystery-Bermuda triangle, Eye of Sahara, Life on Antarctica etc.

## **Health Reporting/Communication**

**Course Code:** CC-7

**Credit:** 5

Contact hours: 5hrs/week

### **Objective:**

- Provide an understanding of health issues and their importance.
- To develop skills in writing on medical/health issues
- To understand communication with respect to pandemics

**Unit I:** Health and everyday life, Advancement in health science; Statistical analysis in health reporting

**Unit II:** Public understanding of health issues – Malnutrition, Malaria, Dengue, Chikungunya, Contagious diseases, Chronic diseases, Checking epidemic, Public awareness about epidemics

**Unit III:** Effects of pollution, Water and Sanitation.

**Unit IV:** Skill of medical writing, Tangible impact of insensible health reporting, Medicine - Systems of medicine, rational use of medicines, issues, misuse, Proper awareness of usage of medicines.

**Unit V:** Pandemic, epidemic, endemic and outbreak. Case study of COVID-19 and its media coverage.

## **Science and electronic media**

**Course Code:** CC-7

**Credit:** 5

Contact hours:  
5hrs/week

### **Objective:**

- Provide an understanding of Science through film/TV and Radio.
- To understand the craft of science films
- To learn science reporting for television and radio

**Unit I:** World of Science Films; Historical perspective of science films across the globe; Introduction to Science Film-making, idea generation, ingredients, approach, elements, director's perspective etc. followed by screening of science films

**Unit II:** Craft of Storytelling in Science Films; Science & Nature through Films; Script for Science Films: Think about visuals for every word of Script; Science on Screen: Dilution without Distortion

**Unit III:** Story Structure, Narrative, Treatment, Film Intent & Content: Reference to Science & Environment Films

**Unit IV:** Science reporting and programming for television and radio: conceptualization to broadcast; Science writing for radio features and drama; Mobile filmmaking – short films on science, environment and health.

**Unit V:** Scientoons & Scientoonics

## Presentation/ Project Work

**Course Code:** CC-8

**Credit:** 5

Any Project/ field-based research project/ Film/ Radio programme/  
Documentary based on Science Communication.

Submission of the project/ programme must be within the time limit. Some of the projects may be:

- i. Preparation of TV or radio program on science.
- ii. Create a popular science blog.
- iii. Short film on science, environment or health issues.
- iv. Any other

## Recommended books

1. The Scientific Edge, written by Jayant V. Narlikar, Penguin Books India
2. Science in Indian Media a blue print for the New Millennium by Dilip M. Salvi
3. *Hindi me vigyan lekhan ke sau varsh*, Vol. I and II, Editor: Shiv Gopal Mishra, Publisher: Vigyan Prasar
4. Journalism, Science and Society: Science Communication Between News and Public Relations by Martin W. Bauer
5. Goepfert, W. (2008) "The Strength of PR and the Weakness of Science Journalism", in Bauer, M.W., and Bucchi, M. (eds.), Journalism, Science and Society: Science communication between news and public relations, New York NY: Routledge
6. Dunwoody, Sharon (2014) "Science Journalism: Prospects in the Digital Age" in Bucchi, M. and Trench, B. (eds), Routledge Handbook of Public Communication of Science and Technology. New York and London: Routledge
7. Science and the Media: Alternative Routes to Scientific Communications (Routledge Studies in Science, Technology and Society) by Massimiano Bucchi
8. Schäfer, M. (2011) "Sources, Characteristics and Effects of Mass Media Communication on Science", Sociology Compass
9. Nature, Special Issue on Science Journalism. Available online at: <http://www.nature.com/news/specials/sciencejournalism/index.html>
10. Allan, Stuart, Media, Risk and Science, UK: Open University Press, 2002.
11. Burkett, D.W., Writing Science News for Mass Media, New York: Greenwood Press, 1969.
12. Claron, Burnett, Agricultural News Writing, Iowa: Kendall Hunt Publications, 1973.
13. Elise, H., Ideas into Words: Mastering the Craft of Science Writing, USA: Johns Hopkins University Press, 2003.
14. Fox, Rodney, Agricultural and Technical Journalism, New York: Greenwood Press, 1969

15. Gregory, J., and S. Miller, *Science in Public: Communication Culture and Credibility*, New York: Plenum Press, 1998.
16. K.T., Richard, *Health communication*, New York: Springer, 2005.
17. Nelkin, D., *Selling Science: How the press Covers S&T*, New York: Freeman & Co., 1987.
18. Rahman, A., *Science and the Human Condition in India and Pakistan*, New York: Rockefeller University Press, 1984.
19. Robert, C., *Environmental Communication and the Public Sphere*. London: Sage Publications, 2015.
20. Seale, C. *Media and Health*. London: Sage Publications, 2002.
21. Soundari, M.H., *Indian Agriculture and Information and Communication Technology*. 2011.
22. Stuart, A. "Science Journalism in a Digital Age," October 2011.
23. Vasudevan, Ravi, *The Melodramatic Public: Film, Form and Spectatorship in Indian Cinema*, New Delhi: Springer, 2006.
24. Vilanilam, J.V., *Science Communication and Development*. New Delhi: Sage, 1993.
25. Anderson, A. (2015) "News Organisation(s) and the Production of Environmental News", in Hansen, Anders and Robert Cox (eds.) *The Routledge Handbook of Environment and Communication*, Oxford and London: Routledge.
26. Goepfert, W. (2008) "The Strength of PR and the Weakness of Science Journalism", in Bauer, M.W., and Bucchi, M. (eds.), *Journalism, Science and Society: Science communication between news and public relations*, New York NY: Routledge
27. Anderson, A. (2014) "Environmental Risk, Protest, and the Network Society", in Alison Anderson, *Media, Environment, and the Network Society*, London: Palgrave
28. Dunwoody, Sharon (2014) "Science Journalism: Prospects in the Digital Age" in Bucchi, M. and Trench, B. (eds), *Routledge Handbook of Public Communication of Science and Technology*. New York and London: Routledge
29. Steve Yearley's (2005) *Making Sense of Science* (London: Sage)
30. Sergio Sismondo's (2004/2010) *An Introduction to Science and Technology Studies* (Oxford: Blackwell / Chichester / Wiley-Blackwell).
31. Barnes, B. (1985), *About Science*, Oxford: Blackwell.
32. Gieryn TF (1999) *Cultural Boundaries of Science: Credibility on Line*. Chicago: Chicago University Press.
33. Bucchi, M. (2002) *Science in Society*. London and New York: Routledge.
34. Chilver, J. and Kearnes, M. (2015). *Remaking Participation: Science, Environment and Emergent Publics*. London: Routledge.
35. Hansen, J. (2010) *Biotechnology and public engagement in Europe*. Basingstoke: Palgrave Macmillan.
36. Horlick-Jones, T.E, Walls, J, Rowe, G, Pidgeon, N.F., Poortinga, W, Murdock, G. and O'Riordan, T. 2007. *The GM debate: risk, politics and public engagement*. Genetics and Society, London: Routledge.
37. Holliman, R., Whitelegg, E., Scanlon, E., Smidt, S. & Thomas, J. (Eds.) (2009) *Investigating science communication in the information age: Implications for public engagement and popular media*. Oxford: Oxford University Press
38. Royal Society (Bodmer). 1985. *The Public Understanding of Science*. London: Royal Society.

39. Rowe, G. and L. J. Frewer. 2005. 'A typology of public engagement mechanisms'. Science, Technology and Human Values, 30 (2): 251–90.
40. Stilgoe, J., S. J. Lock and J. Wilsdon. 2014. 'Why should we promote public engagement with science?' Public Understanding of Science, 23 (1): 4–15.

#### Online Resources

1. <http://op.niscair.res.in/index.php/JST>
2. Journal of scientific temper (online), CSIR-NISCAIR
3. Journal of Krishi Vigyan, ISSN: 2319-6432
4. Science and Technology, Print ISSN: 2394-3750, Online ISSN: 2394- 3769
5. <https://www.nature.com/articles/d41586-017-08862-6>
6. <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.1958>
7. [https://en.wikipedia.org/wiki/Category:Science\\_documentary\\_film\\_stubs](https://en.wikipedia.org/wiki/Category:Science_documentary_film_stubs)
8. <https://www.youtube.com/channel/UCs3NSbBaAHMn1M7WZ0p142Q>
9. <http://pantaneto.co.uk/science-popularisation-through-television-documentary-a-study-of-the-work-of-british-wildlife-filmmaker-david-attenborough-bienvenido-leon/>
10. [https://en.wikipedia.org/wiki/David\\_Attenborough\\_filmography](https://en.wikipedia.org/wiki/David_Attenborough_filmography)
11. <https://www.bbc.co.uk/iplayer/categories/documentaries-science-and-nature/featured>
12. [https://www.youtube.com/playlist?list=PLvjy7KhBadt\\_jrhqk4uzDCiRk4G2OT1GT](https://www.youtube.com/playlist?list=PLvjy7KhBadt_jrhqk4uzDCiRk4G2OT1GT)
13. [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/programme\\_doc\\_documentary\\_script.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/programme_doc_documentary_script.pdf)
14. <https://www.youtube.com/watch?v=GBqqL0wH-x8>
15. BBC Science News / BBC Vigyan Samachar in Hindi
16. DW Germany – Manthan Programme
17. India Science OTT Science Channel, Vigyan Prasar, Govt.of India
18. India Science Wire – news and feature service [www.vigyanprasar.gov.in](http://www.vigyanprasar.gov.in)
19. Science Reporter magazine, CSIR
20. Vigyan Pragati magazine, CSIR
21. Dream 2047 magazine, Vigyan Prasar

## Elective Papers

### AECC 1 & II

To be chosen from a basket of elective courses available at SJMC/othercenters/ SWAYAM in consultation with HOD/ faculty in charge.