

Courses of Study

Certificate program in AI in Public Health: Policies and Preparedness



CLUSTER INNOVATION CENTRE

UNIVERSITY OF DELHI

2023-24

India in its role as the host country for G20 summit under its the Presidency is striving for just and equitable growth in a sustainable, holistic, responsible, and inclusive manner as envisioned in Agenda for Sustainable Development Goals 2030. The Development and Education Working Groups of G20 summit are playing an important role in driving the G20 Sustainable Development agenda and to better understand the sustainable development intersections of G20 actions with efforts to achieve the 2030 Agenda. Sustainable Development Goal 03 highlights the need for Good Health and Well Being. The University of Delhi as a significant contributor in nation's knowledge sphere is committed to foster the vision and mission of G20 summit.

Cluster Innovation Centre, University of Delhi mandates to introduce innovation programs of critical needs that should provide innovative solutions that are meaningful to society and industry.

The DRIIV-Effective Education (Delhi Effective Education and Pedagogy Cluster: DEEP-C; <https://www.deepc.org.in/>) is one of the verticals of the Delhi Research Implementation and Innovation (DRIIV; <https://driiv.iitd.ac.in>) under the aegis of the office of the Principal Scientific Advisor (O/PSA) to Govt. of India The DRIIV-Effective Education (DEEP-C) aims to synergize existing intellectual, infrastructure and financial resources by bringing together academic expertise, industry-based experience and technological advancement ensuring a safe, inclusive, progressive and

technology-driven learning space for all learners. The DRIIV-Effective Education (DEEP-C) consisted of scientists, social scientists, educationists and practitioners identified the need to educate the youth about the changing landscape of public health .

The certificate course on **AI in Public Health: Policies and Preparedness** aims to sensitize, educate and equip college students in holistic perspectives on public health, prevention, safe guards and technology driven sustainable solutions.

Certificate program in AI in Public Health: Policies and Preparedness

What we as a society collectively do to ensure the conditions for people to be healthy. (Public health, The Institute of Medicine, 1988). Public health started out with controlling and preventing infectious diseases, but has since grown to include health care, food safety, child and maternal health, screening for specific diseases, tobacco control, chronic disease control and prevention, emergency preparedness, environmental health, policymaking, and strategic leadership for communities.

Health care reforms, post pandemic demands a paradigm shift from an exclusive focus on clinical medicine to a concerted public health response, thereby making provision for health promotion, disease prevention, and affordable diagnostic and therapeutic health care for all. We are living in the times of a public health crisis that needs urgent attention both in academia and policy making.

Multi-pronged approach has to be adapted to handle the issues such as disease control and prevention, emergency preparedness, environmental health, policymaking, and strategic leadership for communities by various section of the society. There is a human dimension to public health – all sections of India’s population need to be assured of accessible, affordable, and effective health services.

Public Health as a formal discipline should ideally integrate streams of knowledge from diverse disciplines, bringing together learnings and perspectives from life sciences (especially human biology), quantitative sciences (such as epidemiology, biostatistics and demography), social and behavioral sciences (including economics, sociology, anthropology and communication), political science, humanities (especially human rights and ethics), elements of management and further integrating technology such as AI and Machine Learning for effective predication and implementation on public health. This holistic approach, at the moment was underdeveloped in India.

This certificate program on **AI in Public Health: Policies and Preparedness** aims at orienting the undergraduate students to have inter- disciplinary orientation, relevant knowledge and skill-sets to have broader understanding of health issues as well as hindered opportunities for multi-sectoral public health action.

Title of the program: Certificate Program in AI in Public Health: Policies and Preparedness

Duration: One semester (as per University of Delhi Academic Calendar)

Admission to the course: Once a year

Eligibility Criteria: Undergraduate students (Pursuing or passed out)

Number of Seats: 40

Fee: 15,000/-

Program Structure

Program shall be of 24 credits.

Classes shall be held preferably in the evening.

(Duration, credits and grading system are defined as per the University of Delhi norms).

Methodology of Teaching

The program shall be interactive and experiential in nature. The learning discourse shall develop through real time case studies, best practices and field visits. Students will learn basic AI models to understand the issues and impact of health disasters & pandemics, revisiting self-experiences, reflecting upon existing practices and generating suitable resources. The pedagogy shall include assignments, projects, lab work and seminars.

Course Structure

The certificate program in AI in Public Health: Policies and Preparedness shall be of one semester duration. A student has to earn 24 credits as per the details below:

Program Scheme

Course	Title of the course	Number of Credits	Lecture Component
PH 1.1	Understanding the changing nature and scope of public health issues	02	Theory
PH 1.2	Biological Aspects of Public Health	02	Theory +Tutorial
PH 1.3	Assessing the Epidemiology from Public Health Data	04	Theory +Practical
PH 1.4	Use of Artificial Intelligence (AI) and Machine-Learning (ML) in public health	04	Theory +Practical
PH 1.5	Social, preventive and sustainable measures for public health practices	02	Theory + Field Work
PH 1.6	Integrated practicum on Public Health using empirical data (Project Format)	10	Internally evaluated followed by Presentation and Viva Voce Exam
	Total	24	600

Examination Scheme

The program consists of a total of five courses (PH 1.1 to PH 1.6) where both theory and practical would be conducted. The course PH 1.6 shall be taught into project mode. A student shall take up a full-length project under the guidance of a mentor. The project shall be evaluated internally followed by presentation and viva voce examination.

Each course shall have Theory component and PH 1.3, PH 1.4 shall have practical components. There shall be Assignments, Tutorial, Fieldwork, Quiz, Presentation from time to time for the internal assessment. Depending on the progression of the course there could be presentation and/or examination to assess the learning process of the students.

Conversion of Marks into Grades

As per University Examination rule

Grade Points

Grade point table as per University Examination rule

CGPA Calculation

As per University Examination rules.

Span period

As per the University Examination rules

In case of any objection by a student in the evaluation, reevaluation/retotaling shall be done as per the University of Delhi norms.

The certificate will be awarded by Cluster Innovation Centre, University of Delhi. Director of Cluster Innovation Centre will be the signatory.

Course Content Description

The learning outcomes of the Certificate course are as follows:

- understand the changing nature and scope of public health issues;
- learn about the existing policies and provisions on Public Health at national and international including Sustainable Development Goals;
- level discuss the role of public health nutrition and biology, infectious biology and sanitation, and social and preventive medicine;
- Equips with practical exposure on the collection, generation, and analysis of public health
- data using statistical software and econometrics techniques and integrating;
- Prepares the students for the application of artificial Intelligence (AI) and Machine-Learning (ML) as pedagogical tools in public health.

Course Content:

The program on 'Public Health' is interdisciplinary in its nature and scope which makes it equally engaging and beneficial for students of all subject streams. After completing the program, the students can also apply for some higher-level courses in different areas of public health as the course helps in building a basic understanding on different aspects related to public health. The program will include five major theory components. Each theory component will be attached to a practicum so as to give an experiential and hands-on understanding of the public health components. A mini research project (practicum) on any relevant topic related to public health will be taken up after completing the theory and practicum components of the course.

A report of the project can be uploaded online which will be evaluated by the course mentors to award credits to the candidates. Those who successfully complete the course with all its components, practicum and project will be awarded a certificate of course completion.

UNIT 1: Understanding the changing nature and scope of public health issues

Module 1.1: Public health – terminology, policies on public health

Module 1.2: Public health nutrition and biology

Module 1.3: Infectious biology and sanitation

Module 1.4: Social and preventive medicine

Module 1.5: Lifestyle diseases

Module 1.6: Public health issues- Some case studies

UNIT 2: Biological Aspects of Public Health

Module 2.1: Public health nutrition and biology –Application of nutrition concepts to design programs of public health concern.

Module 2.2: Infectious biology and sanitation - Understanding the biology, socioeconomic factors and other environmental conditions that influence the transmission and infection by pathogenic (disease-causing) bacteria, viruses, parasites and fungi;

Module 2.3: Social and preventive measures: Define and manage the health problems of the community, Plan, implement and evaluate various health programs of mental Health, reproductive health, Maternal health, Family Welfare and disease control / eradication.

Module 2.4: Lifestyle disease or non-communicable diseases that are a consequence of imbalanced nutrition, environmental and psychological stresses and poor work-life balance. Management of diseases like Obesity, Diabetes mellitus, Cardiovascular disorders, sleep disorders and psychological eating disorders.

UNIT 3: Assessing the Epidemiology from Public Health Data

Module 3.1: Collection, generation, and analysis of public health data,

Module 3.2: Application of statistical tools to analyze and present public health data,

Mathematical modelling, generating data online, understanding on computation, meta-analysis

Module 3.3: Transforming public health data into policy formulation and recommendation

Unit 4: Use of Artificial Intelligence (AI) and Machine-Learning (ML) in public health

Module 4.1: Application of AI/ML in diagnosis & prognosis of the disease

Module 4.2: Application of AI/ML in analysis of medical data for interpreting disease progression

Module 4.3: Application of AI/ML in patient monitoring and care

Module 4.4: Application of AI/ML in developing algorithms for disease management

(Lab work: learning essential digital data analytics skills)

Unit 5: Social, preventive and sustainable measures for public health practices

Holistic approach to understand public health (dimensions – multidimensional problem – discussion with examples – Delhi example – air pollution, mental health/stress - explaining our other verticals in the project and how we are integrating those with public health)

Awareness campaign, role of society and community workers, awareness and readiness for preventive measures

Practicum: Conducting a local or online survey to identify the major diseases and using various data visualization techniques to make sense of the data for further research & interpretations.

Practicum: Collecting data related to public health, diseases, sanitation, etc. and drawing correlations and comparisons by using statistical tools; reading and interpreting National Health Policy and collecting relevant data.

Project: To be decided by the students.

References:

1. Introduction To Public Health Mary Jane Schneider, Jones and Bartlett Publishers, Inc; 6th edition, 2020.
2. Spillover – Animal Infections and the Next Human Pandemic. David Quammen, W. W. Norton & Company; 2012.
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5. Manual on Zoonotic Diseases of Public Health Importance. National Centre for Disease Control (<https://ncdc.gov.in/WriteReadData/1892s/File618.pdf>), 2016.
6. Exploring the relationship between the emergence of zoonotic diseases and the inhuman touch of habitat loss and wildlife trade. Tiwary, N. K., Singh, G., & Bhaduri, A. . in Multidimensional Approaches to Impacts of Changing Environment on Human Health CRC Press, Taylor & Francis Group, 2022.
7. Jungwirth, D.; Haluza, D. Artificial Intelligence and Public Health: An Exploratory Study. Int. J. Environ. Res. Public Health 2023, 20, 4541. <https://doi.org/10.3390/ijerph20054541>
7. Mukhamediev, R.I.; Popova, Y.; Kuchin, Y.; Zaitseva, E.; Kalimoldayev, A.; Symagulov, A.; Levashenko, V.; Abdoldina, F.; Gopejenko, V.; Yakunin, K.; et al. Review of Artificial Intelligence and Machine Learning Technologies: Classification, Restrictions, Opportunities and Challenges. Mathematics 2022, 10, 2552. <https://doi.org/10.3390/math10152552>

Specific papers, presentations, notes will be shared with the students during the course.