The **Department of Biosciences, Union Christian College, Aluva** is offering an **Online Certificate Course in Gene Editing Tools in Medicine & Biotechnology** in association with **Department of Biology, Indiana University of Pennsylvania, Indiana, PA 15705, USA.**

Course Description

As advances in biotechnology and gene editing gain momentum, so do our understanding of the principles and techniques governing the gene editing tools. The course will describe in detail the development and application of several gene editing technology like CRISPR in agriculture, animal sciences, human health, and environment. A wide variety of applications of editing process including basic biological research, development of biotechnology products, and treatment of diseases will be discussed. The course will also address issues concerning their ethical, legal, and social implications in the United States and around the world.

Student Learning :

1. Understand the fundamental properties of different types of genome editing methods and their molecular mechanisms.

2. Understand the basic mechanisms of genome editing tools like restriction enzyme digestion, Zinc finger nucleases, TALENs gene editing, and CRISPR-Cas9 Gene editing.

3. Apply basic genome concepts to the understanding of how do gene editing works?

4. Utilize basic mechanisms of CRISPR-Cas9 in genome engineering of prokaryotes, plants, animals, and humans and the role it plays to study genes, cellular function, disease progression & therapeutic applications.

Faculty Instructor:

N. Bharathan, PhD, Professor & Chair, Biology, Indiana University of Pennsylvania, Indiana, USA.

Online Certificate Course on Gene Editing Tools in Medicine & Biotechnology

Course Co-ordinator

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Union Christian College, Aluva

THE TRUTH SHALL MAKE YOU FREE

&

IUP Indiana University of Pennsylvania

23rd Oct. - 19th Dec. 2021

Online Certificate Course on Gene Editing Tools in Medicine & Biotechnology

Teaching Model

Student learning through discussion forums, assignments, and Zoom delivery. Participation in class is necessary regardless of where and how students attend. Online is not meant to be a diminished experience, but an alternative. Class sessions are not meant to be passive observations of a class video stream, but rather to have fully interactive engagements, including Q&A, group work (if possible) and student presentations.

Evaluation

1. Written Assignment I—10%
2. Written Assignment 2—10%
3. Three Short Exams—30%
4. Discussion Forums—20%
5. Final Exams –30%

Evaluation Methods and Grading Policy:

A student's final grade reflects performance in the lecture exams; class participation/and critique of written assignments. Your grade in the course will be composed of i) 60% examinations – Exams will be Multiple choices and short answer essays. **All will have to take Final Exam to get Final Grade.** ii) 20% Written Assignments and Discussion Forums (20%) - Students will have to select TOPICS for **Written Assignment 1** & **Written Assignment 2**. Total assignment will be worth 20% of the final grade.

All will have to submit assignments and participate in Discussion Forums to get a FINAL Grade. Course Grades; Grading will be based on a straight percentage scale.

A= 90%-100%, B= 80%-89%, C= 70%-79%, D= 60%-69% and F= Less than 59.1%

After successful completion of the course, Students will be awarded a Certificate jointly signed by Faculty Instructor from Indiana University of Pennsylvania (IUP) USA and Union Christian College, Aluva, Kerala.

The Certificate will reach you by Post/Courier.

Course Modules

Introduction: What is Genome Editing?

Module 1

Structure and organization of DNA in prokaryotic and eukaryotic cells, Chromatin structure, Gene structure and function.

Module 2

Discovery and basic principles of gene editing, How does gene editing tool work?.

Types of Gene Editing tools:

Restriction Enzymes, Zinc Finger Nucleases, Talen Gene Editing, CRISPR-Cas9 Gene Editing.

Module 3: Application and operation of CRISPR/Cas9 system as a genome editing tool:

CRISPR Application in Agriculture: To enhance Traditional Breeding Techniques in Non-Traditional Ways.

CRISPR Application in Humans: Advances in therapeutic application of CRISPR-cas9, CRISPR application for immune drug development, CRISPR babies.

Module 4: CRISPR/Cas9 in Disease Models

Pulmonary and gastrointestinal diseases, Hematologic diseases including sickle-cell diseases, Viral cause of diseases (HIV and Human papilloma virus), Vector borne diseases (malaria): **Gene Drive:** Cancer and cancer drug development using CRISPR

Module 5: Unusual Applications of CRISPR i) pet breeding, ii) allergy free foods, decaf coffee beans, nutritious fish, iii) greener fuels, iv) eradicating pests, v) faster racehorses, vi) de-extinction, vi) ecosystem protection

Module 6: CRISPR Ethics: Moral Considerations for Applications of CRISPR

i) Ethical challenges created by CRISPR, ii) Biological consequences of gene editing a gene in germ line/and somatic cells, iii) In translational and clinical medicine, iv) Fertility applications, v) Regulation for clinical research involving human subjects, vi) Establish framework in some countries to manage research risks, vii) Ecosystem alteration to protect endangered species, viii) Prevention against misuses of technology, ix) Justice in CRISPR/Cas9 research and clinical applications

In addition, we will use news articles on CRISPR technology topics from current media and publications for discussion.

Course Details

Credits—3

Eligibility - B.Sc., M.Sc., Ph.D (Biological Sciences)

(Open for Students & Faculty from Institutes in India only)

Course commencement - 23rd October 2021

Days - Saturdays and Sundays (7.00 pm to 8.30 pm)

Mode - Online

Course Fees:

Rs.5000 for UC College Students & Faculty

Rs.10000 for other Institutions/Colleges

(Payment to be made only by selected candidates)

Mode of Selection - Based on Merit /Research Interest

Total number of Seats - 40

(30 for UC College and balance to others)

To register:

https://forms.gle/etD4em76aPDuagVUA

(Last Date for Registration: 20th Sept. 2021)