

Brief Report

Online Certificate Course on Gene Editing Tools in Medicine & Biotechnology

The Department of Biosciences, Union Christian College (UCC), Aluva, India signed a MOU with Indiana University of Pennsylvania (IUP), PA 15705, USA for academic collaboration and student exchange from March 2021 onwards. As a part of the collaboration, the College of Natural Sciences & Mathematics and Department of Biology, Indiana University of Pennsylvania, offered an Online Certificate Course on “**Gene Editing Tools in Medicine & Biotechnology**” under the mentorship of Dr. N. Bharathan, Chairperson & Professor, Biology Department for the post graduate students, faculty and research scholars of Biosciences Department of UC College and a limited number of outside students and research faculty.

As advances in biotechnology and gene editing are gaining momentum worldwide, our understanding of the principles and techniques governing the gene editing tools needs updating. The course envisaged 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 gene editing process including basic biological research, development of biotechnology products and treatment of diseases were discussed during the course of study. The course also addressed issues concerning ethical, legal and social implications in the United States and elsewhere in the world.

The virtual classes were held from 23rd October to 19th December, 2021. Dr. N. Bharathan, Chair, Biology (IUP) took classes for 2 - 3 hours every Saturday & Sunday through Zoom platform. Dr. Susan Eapen was the Program Advisor and Dr. Sareen Sarah John, the Course Co-ordinator of the program.

The Teaching Model

The teaching model implemented was by students learning through discussion forum and assignments through Zoom platform. Participation in class was necessary

regardless of where and how students attended. Online was not meant to be a diminished experience, but an alternative. Class sessions were not meant to be passive observations of a class video stream, but rather to have fully interactive engagements, including Q&A, group work and student presentations. In addition, we used news articles on CRISPR technology topics from current media and publications for discussion.

Evaluation

1. Written Assignment I - 10%
2. Written Assignment 2 - 10%
3. Three Short Exams - 30%
4. Discussion Forum - 20%
5. Final Examination - 30%

Evaluation Methods and Grading Policy

A student's final grade reflects performance in the lecture exams, class participation and/ critique of written assignments. The grade in the course will be composed of;

- i) 60% for examinations – Exams were multiple choices and short answer essays.
- ii) 20% for Written Assignments and Discussion Forums (20%) - Students were required to select topics for Written Assignment 1 & Written Assignment 2. Total assignments were worth 20% for the final grade.

All students were required to submit assignments and participate in Discussion Forums to get the Final Grade.

Course Grades

Grading was based on a straight percentage scale. A = 90% - 100%, B = 80% - 89%, C = 70% - 79%, D = 60% - 69% and F = Less than 59.1%.

As per the teaching model, two exams were conducted to assess the knowledge gained by each participant. After the completion of the course on Gene Editing the students were able to understand the fundamental principles of different types of

genome editing methods/tools and their molecular mechanisms, Restriction enzyme digestion. Zinc finger nucleases, TALENs gene editing and CRISPR-Cas9 gene editing including the applications of CRISPR-Cas9 in genome engineering of prokaryotes, plants, animals and humans as well as the role it plays to study genes, cellular function, disease progression and therapeutic approaches.

After successful completion of the course, the forty four participants (38 belonging to UCC and 6 from outside) were awarded a certificate jointly signed by the Faculty Instructor from Indiana University of Pennsylvania (IUP), USA and the Principal, Union Christian College, Aluva, Kerala.

Dr. Susan Eapen
Program Advisor

Dr. Sareen Sarah John
Program Coordinator

UC College,
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