

Biotechnology Course for Teachers, summer 2009 (tuition for this course has been waived by the instructor). Registration is limited to 10 teachers only.

MBBE461 (Biotechnology for Teachers; 2 credits): Modern biotechnology is often called 'molecular biotechnology', which is relatively a new technology based on genetic engineering for producing useful products and services. This emerging technology is going to have a major impact on our lives in this century and beyond. With the completion of the human genome project, a new generation of recombinant drugs and vaccines are being developed for treatment and prevention of illness. New crop plants such as "Golden Rice" producing vitamin A in rice grain will revolutionize agriculture. It is important that we teach this technology now at schools. Science teachers of Hawaii can immensely benefit from this course, which will be taught by Professor Dulal Borthakur. The two-week summer curriculum will include lectures, discussions and some laboratory exercises on recombinant DNA technology. The topics for discussion include: classical examples in biotechnology, concept of a gene, cDNA, gene regulation, methods in creating recombinant DNA molecules, plasmids, gene library, expression vectors, genetic transformation, conjugation, transfection, PCR, isolation of cloned genes, mutagenesis, production of commercial products in bacteria, plants and animals, transgenic fishes, cloning animals, and recombinant vaccines. Laboratory exercises will include genomic DNA isolation, preparation of plasmid DNA, restriction digest, transformation, DNA sequencing, PCR amplification of genes, and protein isolation and analysis using acrylamide gel electrophoresis.

Instructor: Dulal Borthakur, Professor Department of Molecular Biosciences and Bioengineering. Tel: 956-6600; email: dulal@hawaii.edu

Lecture (1 hour everyday, 9:00 – 10:00)

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| 1. | July 6 | Biotechnology, recombinant DNA technology |
| 2. | July 7 | DNA restriction enzymes, vectors |
| 3. | July 8 | PCR, oligonucleotides and other methods |
| 4. | July 9 | Recombinant proteins in prokaryotes and eukaryotes |
| 5. | July 10 | Protein engineering |
| 6. | July 13 | Genetic engineering plants |
| 7. | July 14 | Genetic engineering of animals. |
| 8. | July 15 | Recombinant vaccines |
| 9. | July 16 | Biotechnology of soil microbes |
| 10. | July 17 | Biological insecticides, examples recombinant DNA technology to make commercial products |

Laboratory experiments (2 hours everyday, 10:30 – 12:30)

1. DNA preparation
2. Plasmid DNA isolation
3. Restriction Digest
4. Agarose gel electrophoresis
5. PCR
6. DNA sequencing
7. Analysis of sequence data

For inquiries, please contact Dr. Dulal Borthakur at 956-6600 or dulal@hawaii.edu.