FST- 444 Applications of Synthetic Biology in Food Science   3(3-0)

Educational Objectives

The goal of the course is to provide an overview of synthetic biology advances and their applications. Students will get hands-on experience in molecular cloning and genetic engineering related to food industry applications. Use of genetically modified organisms in the food industry as preservatives as well as food safety. It will also help in the understanding how the synthetic biology is used in shaping the development of varying areas ranging from biomedicine, biopharmaceuticals, chemical production, food and dairy quality monitoring, packaging and storage of food and dairy products, bioremediation and bioenergy production .

Course outcomes

On completion of this course, the student will be able to learn:

- Analytical skills, the ability to assess the relative merits of new methods and application of these biological methods in different areas of food industry
- The capacity to recognize and critically appraise the opportunities presented by new biological discoveries
- The ability to look at a wide range of problems from the perspective of solving these with innovative bio-based solutions and helped in resolving the issue of food security.

Course Contents

- Fundamentals of synthetic biology
- Synthetic biomolecules
- Minimal genomes
- Synthetic biology tools
- Synthetic biology applications in dairy industry
- Synthetic biology to engineer probiotics
- Synthetic biology for functional foods
- Improving downstream processing of waste
- Food quality monitoring
- Food packaging
- Impact on health
- Concerns on public health

Recommended Books

1. Huimin Zhao, Synthetic biology tools and applications, Academic Press
2. Synthetic biology: industrial and environmental applications, Willey-Blackwell
3. Christina Smolke, Sang Yup Lee, Jens Nielsen, Gregory Stephanopoulos, 2018, Synthetic biology: parts, devices and applications, Wiley-Blackwell