# BIOTECHNOLOGY

DEGREE AND CERTIFICATE PROGRAMS

CAPITAL Community COLLEGE

# WHAT IS BIOTECHNOLOGY?

- Biotechnology is the use of living organisms and biology to create useful products
- Biotechnology plays a role in:
  - drug discovery
  - genetic testing
  - diagnosis of diseases
  - forensics
  - agriculture
  - manufacturing
  - environmental protection

CT Health & Life Sciences Career Initiative (HL-SCI)

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# INSULIN: THE FIRST BIOTECH DRUG

- Diabetes is a common metabolic disease that is characterized by high levels of glucose in the blood due to defects in cells:
  - an inadequate production of insulin
  - reduced response to insulin
- Before 1982, insulin was harvested from the pancreas of pigs and used to treat humans
- In 1982, Genentech was approved to sell the first biotech drug – insulin



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# USING BIOTECHNOLOGY TO CREATE INSULIN

- DNA is the genetic material that controls the characteristics of living organisms
- Scientists took the human insulin gene and placed it in bacteria:
  - increased the supply of insulin
  - decreased the cost of producing insulin
- To date more than 200 drugs and vaccines have been developed using biotechnology processes



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# MOLECULAR CLONING OF THE INSULIN GENE



# WHAT DOES A TYPICAL BIOTECHNOLOGY PROGRAM LOOK LIKE?

https://www.youtube.com/watch?feature=player_embedded&v=BmhHxujAM5g

# CAREERS IN BIOTECHNOLOGY

- **Human health benefits:** therapeutics, diagnostics, research
- **Agriculture:** crop protection and decreased need for herbicides/pesticides
- **Food production/processing:** milk production; cloning cows (2008); production of high fructose corn syrup; healthier oils; better preservatives
- **Biofuels:** ethanol production
- **Environmental protection:** enzymes as alternative to solvents; biosensors to detect and measure toxins; fermentation of plant materials into “green” plastics; production of paper, fabric and minerals
- **Forensics and security:** DNA fingerprinting; biosensors to detect explosives, poisons and pathogens

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# EMPLOYMENT OUTLOOK

- Nationally, there is forecasted 14% increase in Biological Technician jobs in the U.S. (source: Bureau of Labor Statistics)
- Statewide, the CT DOL projects a 16.1% increase in the need for Biological Technicians
- Average annual wage for Biological Technicians is $39,020 nationally and $51,765 in CT



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- Most of the courses within the program will be existing foundational courses in math, biology, and chemistry
- <u>New Biotechnology Core Courses</u>:

  Basic Techniques in Biotechnology (4 credits)

  Advanced Techniques in Biotechnology (4 credits)

  Synthetic Biology (4 credits)

  Seminar in Biotechnology (2 credits)

  Biotechnology Internship (4 credits

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# ADVICE FOR STUDENTS INTERESTED IN BIOTECHNOLOGY PROGRAM

- Students can register for the

**BIO*130:** Basic Techniques in Biotechnology

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