Workforce Objectives:

Biofuels

-metabolic pathway design

-fermentation

Genetically Engineered Crops

- Drought resistance
- Heat tolerance

Emerging Diseases

- identify / sequence
- design vaccines / therapeutics

Target Skills for Workforce Development

Genetic engineering of crops to withstand drought

Development of Bio-fuels & sustainable energy production

Vaccine & therapeutics development, drug design

Biotechnology in Environmental Management

Claflin University

Master of Science In Biotechnology for Climate Change

A Masters of Science Degree Program specifically designed to teach how to *use* the science of *Biotechnology* to *mitigate/adapt to the impacts of Climate Change*

→ Will be the only Biotechnology program that targets climate change!

Course Delivery

- Fully Online
  - Easy to use Learning Management system + Zoom
- Asynchronous
  - optional synchronous lectures / activities

(Lectures will be presented synchronously and recorded for asynchronous learners)

The Students We Are Recruiting:

US and International graduates with a Bachelors of Science Degree in Biology, Chemistry, Environmental Science or related field.

Full time or Part time

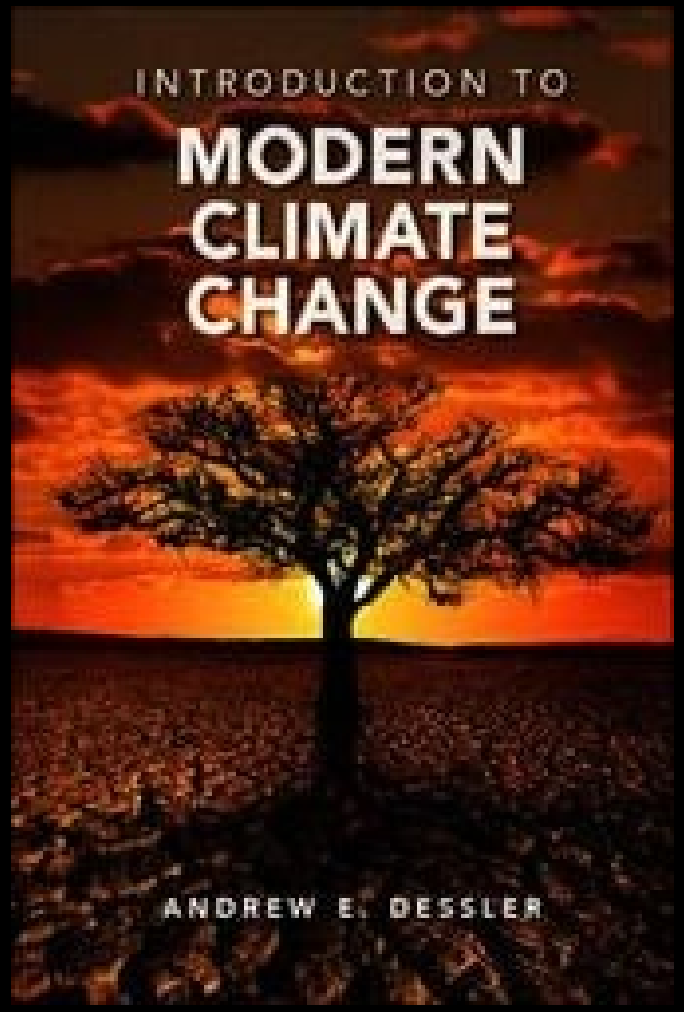
Inclusive of all genders and nationalities

Program Structure

10 Courses (30 Credit Hours)

+ Capstone Project

Introduction to Climate Change



Keystone course

taken in the 1st semester

3 Credit Hours

Create a common understanding of modern climate change

- Set the stage for each of the other courses

Genetic Engineering

Advanced molecular biology techniques including

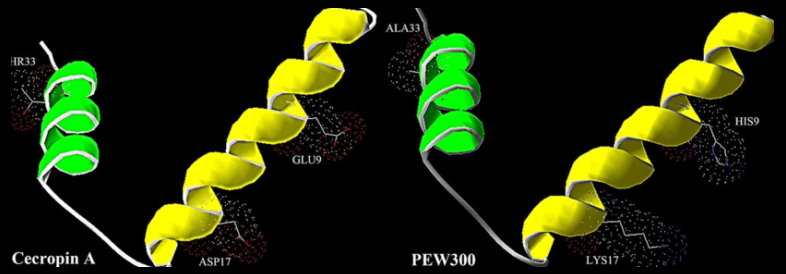
gene cloning

gene modification

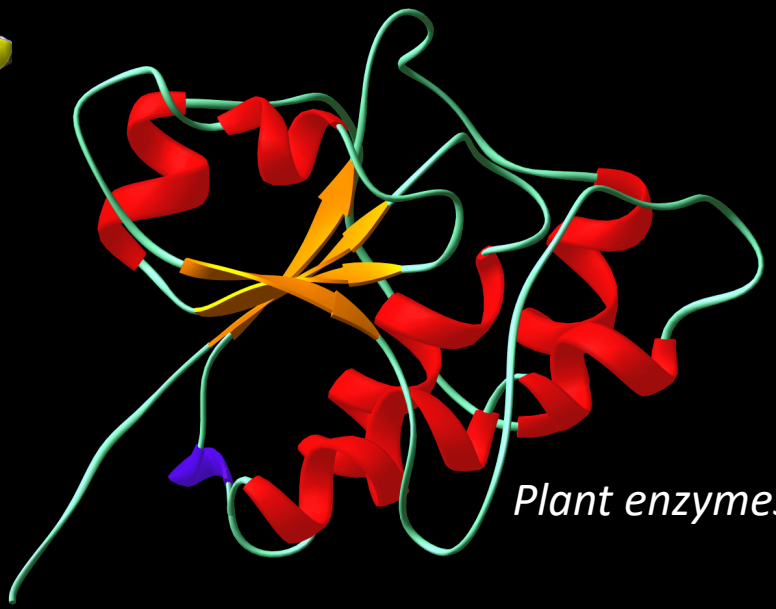
CRISPR gene editing

Protein Structure & Design

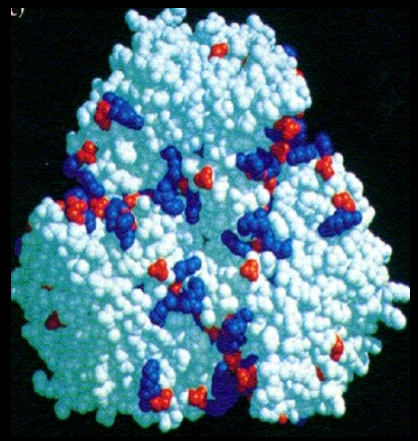
Throughout the course, various protein structures are explored
- active sites detailed
- structure-function relationships explored



Mosquito Protein-Cecropin A CRSPR/CAS9 malaria resistant mutant



Plant enzymes



vaccines

Biofuel enzymes

Insect receptors

- Proteins may be selected from other courses in the curricula

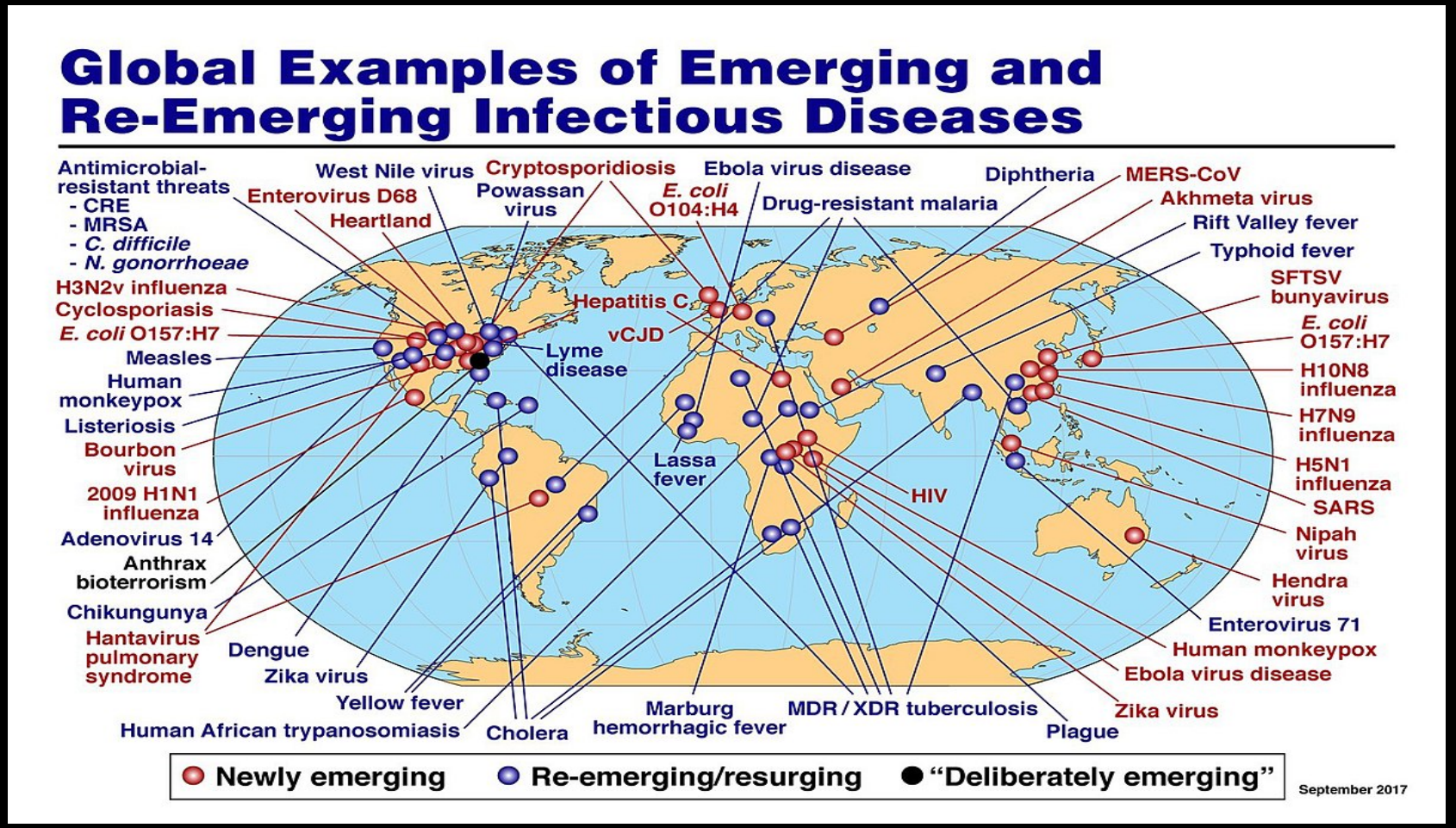
Plant Biotechnology

Measure	Biotechnology	Application	Reference
Climate change mitigation:	Engineering herbicide resistance to reduce spraying	GM soy beans GM canola	Fawcett and Towery, 2003; Brimner *et al.*, 2004; Kleter *et al.*, 2008
Reduced use of fertilizer	Engineering nitrogen fixation	Genetic improvement of *Rhizobium*; inducing N-fixation to non-legumes	Zahran, 2001; Yan *et al.*, 2008
Carbon sequestration	Green energy	GM energy crops	Lybert and Summer, 2010

	Nitrogen- efficient GM crops	N-efficient GM canola	Johnsona *et al.*, 2007
Adaptation to climate change:	Molecular marker assisted breeding for stress resistance	Drought resistant maize, wheat hybrids	Wang *et al.*, 2001, 2003
Adaptation to biotic and abiotic stresses	Engineering drought tolerance	GM Arabidopsis , Tobacco, maize, wheat, cotton, soybean	Hong *et al.*, 2000; Jaglo *et al.*, 2001; Yamanouchi *et al.*, 2002
	Engineering salt tolerance	Drought resistant Pearl millet GM tomato, rice	Hsieh *et al.*, 2002;
	Engineering heat tolerance	GM Arabidopsis, GM *Brassica* Sp.	Jaglo *et al.*, 2001; Zhu, 2001.

Food Security

Emerging Diseases



Capstone Project

Students present a detailed Scientific Proposal to use a biotechnological application to mitigate a specific Climate Change related problem.

Proposal must address indigenous regulations, policies, and politics

This proposal may be done independently or in partnership with a program professor, home institution, industry sponsor, or in conjunction with their current employer if applicable.

Sample Curriculum

Semester	Title	Credits
Fall I	Introduction to Climate Change	3
Fall I	Genetic Engineering	3
Fall I	Research Ethics	2
Spring I	Emerging Diseases	3
Spring I	Protein Structure, Function, & Design	3
Spring I	Plant Biotechnology	3
Fall II	Mitigation of Climate Change	3
Fall II	Data Science	3
Spring II	Environmental Policy & Management	3
Spring II	Food Security & Safety	3
Spring II	Capstone Experience	1

Certification

Certificate of Expertise in Use of Biotechnology for Applications

For Climate **Change**

For successful completion of 12 hours of courses

Ambitious Goals

- Lectures & Labs in XR (Year 3)

- Modules for hands-on laboratories & simulations

- Virtual Worlds, Landscapes, Habitats, & Climate affected areas

We have high expectations

Teaching & Learning in “XR”

Admission Requirements

B.S. in Biology, Chemistry, Environmental Science or related disciplines

Min 3.0 GPA

Official Transcripts

TOEFL or IELTS in cases where official language is not english

300-500 Word essay

Resume or CV

Three letters of recommendation

Claflin University

U.S. News and World Report **Best Colleges 2022** Rankings

Visionary Leadership

Mentoring leaders, problem solvers, & agents of change

What Sets Claflin Apart

As an HBCU We Excel in Pedagogy

- Especially for non-traditional learning styles
- Research based methods in Teaching & Learning
- Know How to foster inclusive environments
- Social justice
- Experience with a worldwide audience

Enrollment Projections

20 Students in first year

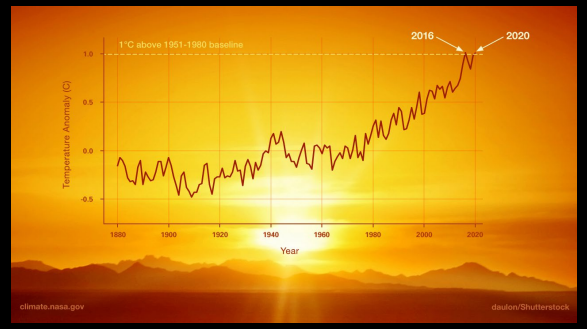
40 students second year (2x20 student cohorts)

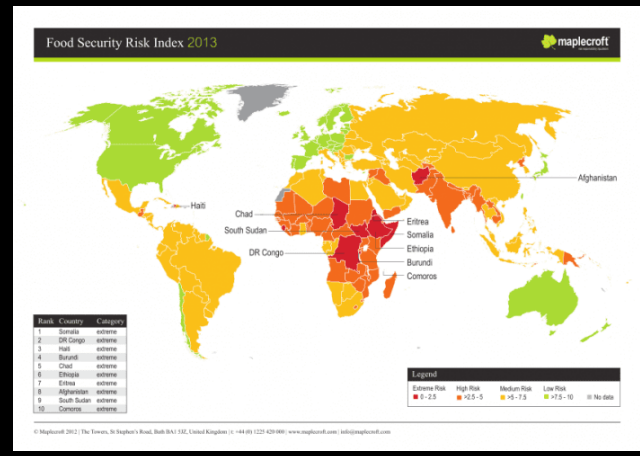
Cost to students:

$1,000/credit hour

Projected Revenue:

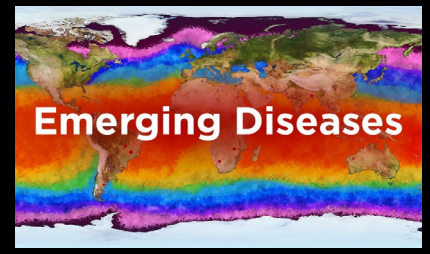
$340,000 1st yr $600,000/yr after 1st

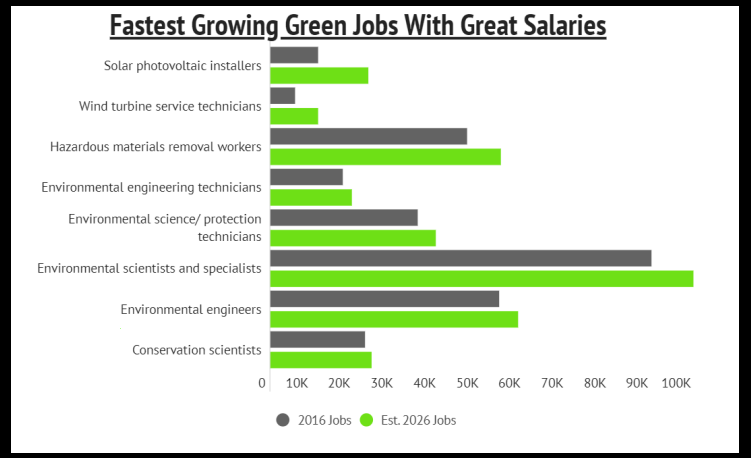




Thank You!

Questions?





Partnership with Africa University

Builds on a Partnership with Africa University in Zimbabwe

Multiple Exchange Visits to and from Africa University in STEM

Multiple Collaborative Activities between CU and AU

- Seminars
- Workshops
- Research Projects

Commitment to providing students for the Online Masters Program

→ Provided a seed grant of $35,000 for course development & animations