IBIEM Training Program Overview

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IBIEM

Integrative Bioinformatics for Investigating and Engineering Microbiomes

http://www.ibiem.pratt.duke.edu

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The NSF Research Traineeship (NRT) program is designed to encourage the development and implementation of bold, new, and potentially transformative models for STEM graduate education training. The NRT program seeks proposals that ensure that graduate students in research-based master's and doctoral degree programs develop the skills, knowledge, and competencies needed to pursue a range of STEM careers. The NRT program includes **two tracks**: the **Traineeship Track** and the **Innovations in Graduate Education (IGE) Track**.

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The **Traineeship Track** is dedicated to effective training of STEM graduate students in high priority interdisciplinary research areas, through the use of a comprehensive traineeship model that is innovative, evidence-based, and aligned with changing workforce and research needs.

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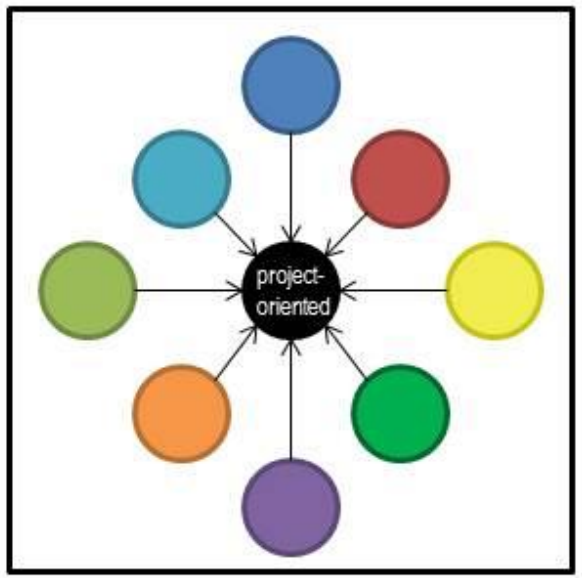
NRT Specific Program Components

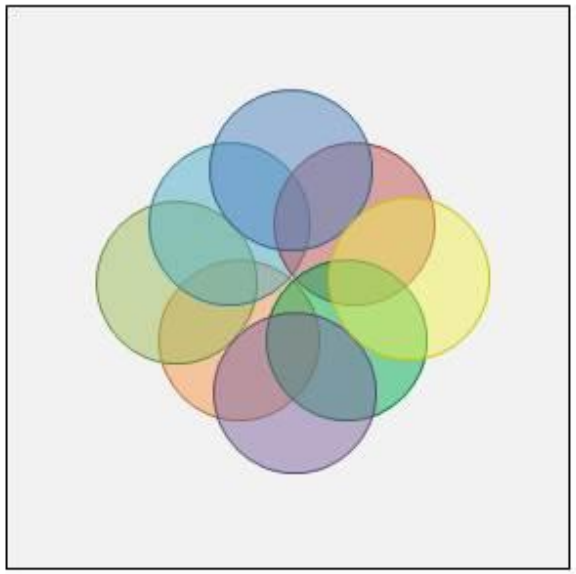
- Integration of Research and Education
- Interdisciplinarity
- Professional Development
- Integrating Diversity
- Evaluation

Multi- → Inter- → Transdisciplinary

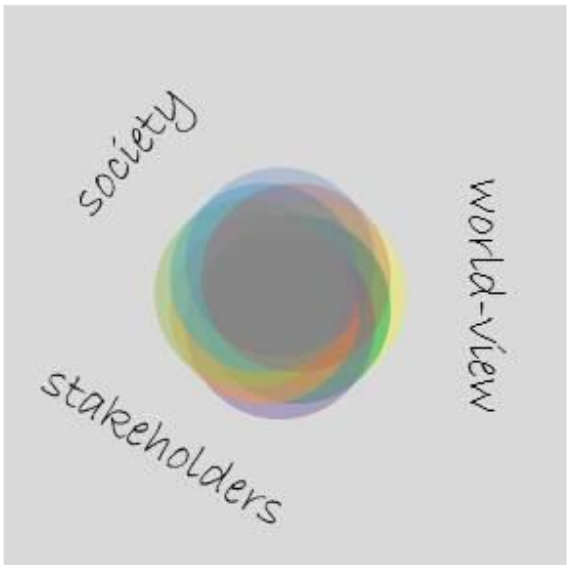
Multidisciplinary



Interdisciplinary



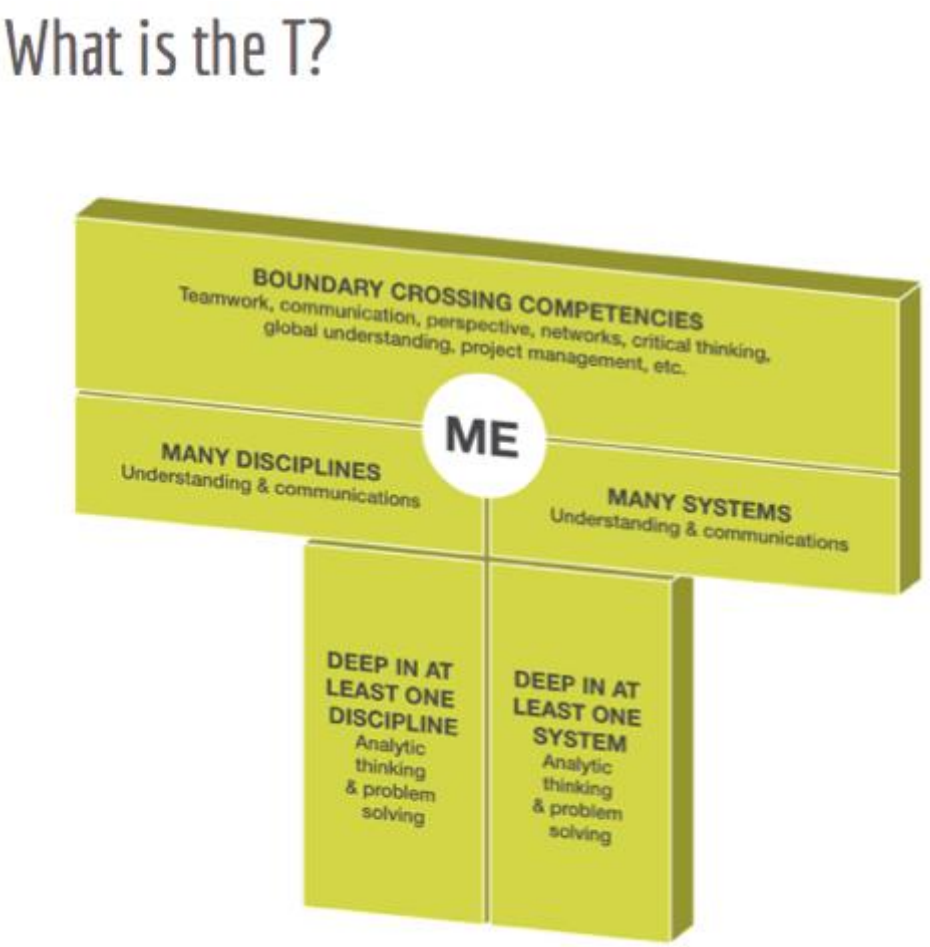
Transdisciplinary



- **Integration:** Separated → Integrated → "Become One"
- **Perspective:** ≥ 2 disciplinary → include stakeholders+
- **Team's Goals:** Project → Learning, New Ideas → Problem Oriented
- **Leadership:** Varied Leadership → Rotating Leadership?

T-Shaped Talent

- Academia Optimizes
  - I for individual work
  - Individual IQ
  - Disciplines
- Business Optimizes
  - T for team work
  - Team IQ
  - Systems
- Both Important
  - Depth & Breadth
  - Disciplines & Systems



Meta-Omics: exploding the "black box"

MICROBIOTA

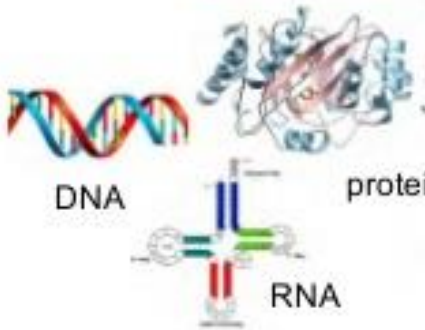
A

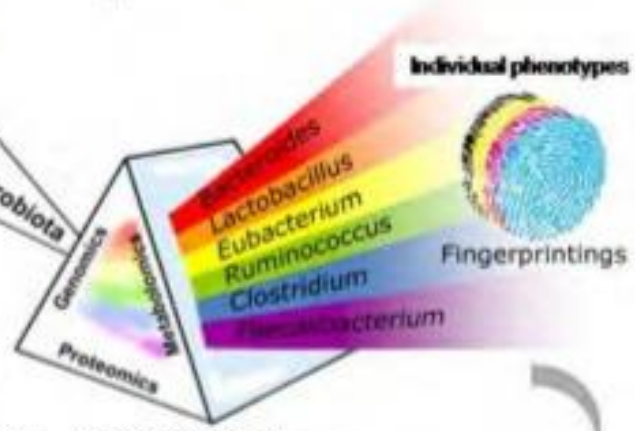
MICROBIAL DIVERSITY

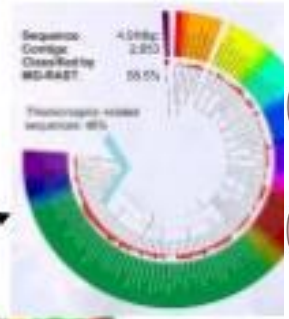
B

THE META-OMICS PRISM

High-throughput sequencing







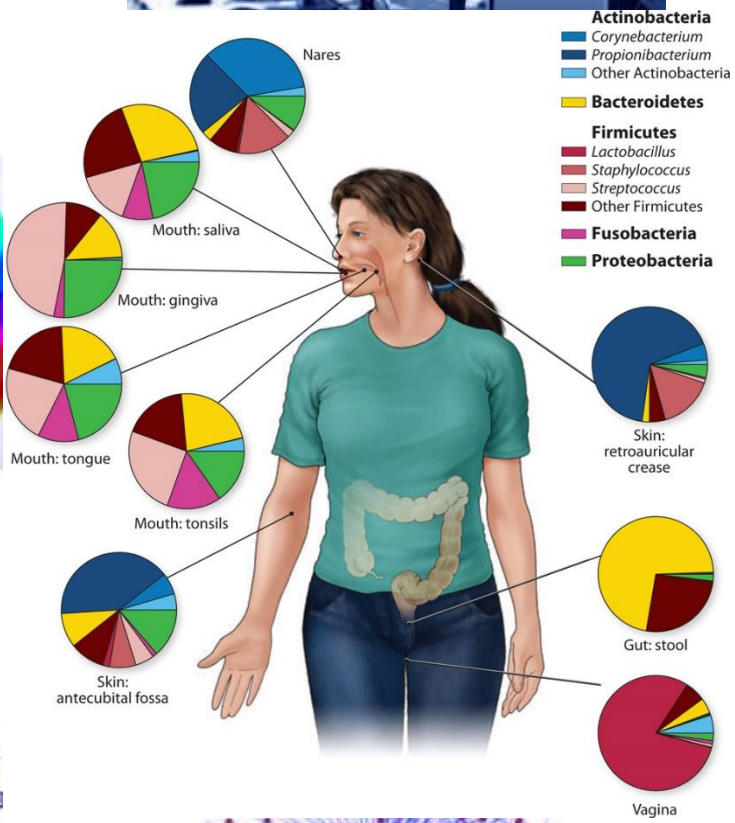
High resolution community diversity and functional profile

C

ENVIRONMENTAL MICROBIOME

Unraveling biodiversity and ecosystem function

Adapted from Del Chierico et al., 2012



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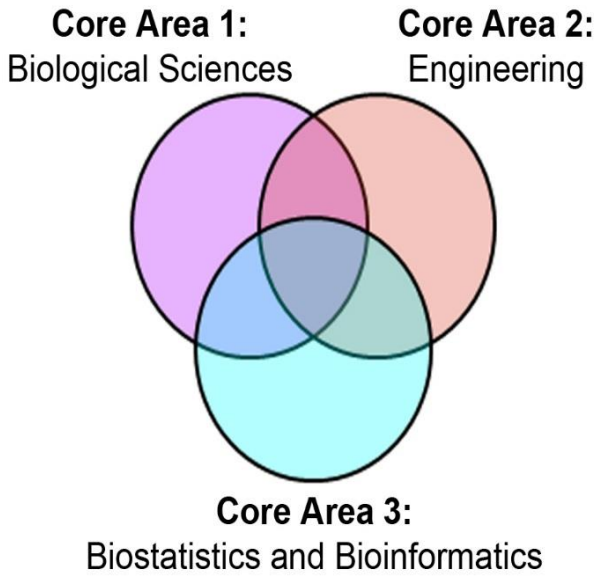
Implementation = Team Science!
30+ Faculty with Complementary Expertise



	Molecular Interactions (MI) ⟷ Complex Microbial Systems (CMS)	
Biological Sciences (CA1)	Identification of key molecular mechanisms of microbial interaction	Study of complex natural communities, and development of model synthetic communities
Engineering (CA2)	Development of strategies for controlling gene expression, activity, and transfer in simple microbial communities	Manipulation of complex microbial community structure and function for a particular environmental or biomedical process
Biostatistics and Bioinformatics (CA3)	Statistical design, analysis and modeling of multi-omic datasets for simple microbial communities	Bioinformatics integration and statistical design, analysis and modeling for complex microbiomes incorporating spatial and dimensional heterogeneity

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Programmatic Elements

Boot Camp

Description:
Series of one day workshops on various relevant topics
Goal: Develop common terminology and camaraderie

Collaborative Science Practicum 1

Description: Series of diverse short team projects led by targeted academic and industrial partners

RTI INTERNATIONAL
AgBiome
NOVARTIS

Collaborative Science Practicum 2

Description: Capstone-like project designed and executed by IBIEM Trainees

Interactive Seminar Course

Description:
Trainees present their research design and data structure for feedback from peer and faculty mentors

Skill Workshops

Professional Skills Workshops

Seminar Series and Annual IBIEM Symposium

Required Coursework to satisfy Trainee's Home Department Requirements

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Current IBIEM Trainees

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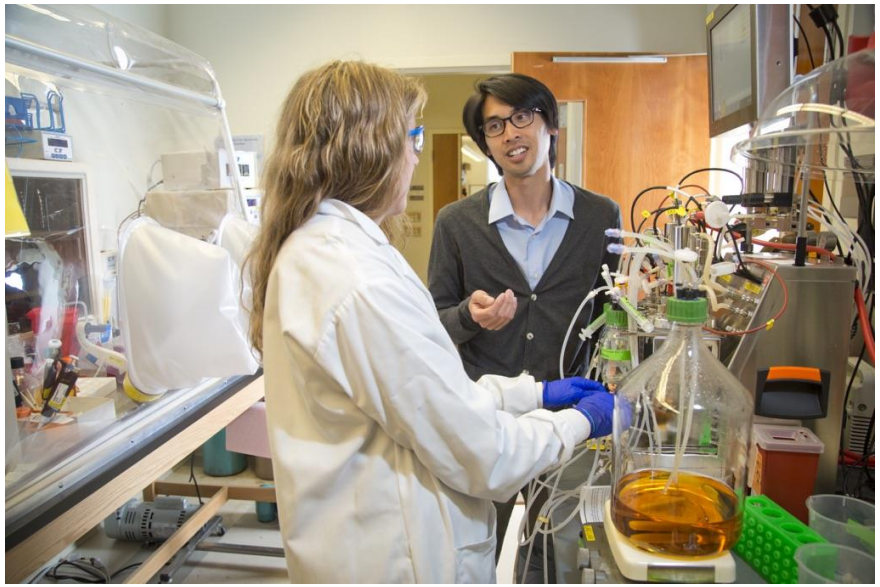

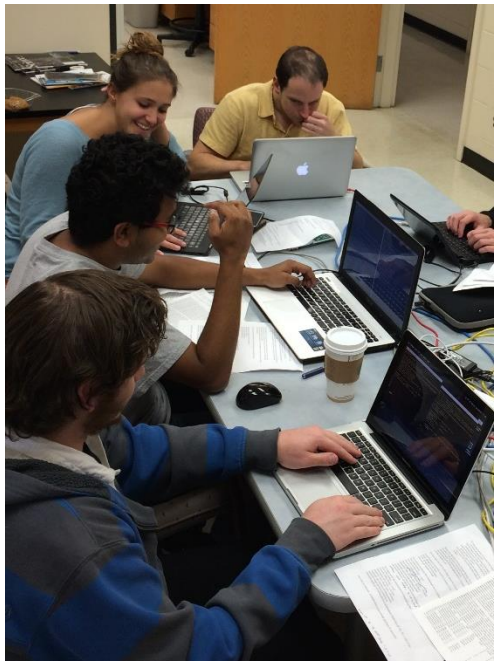

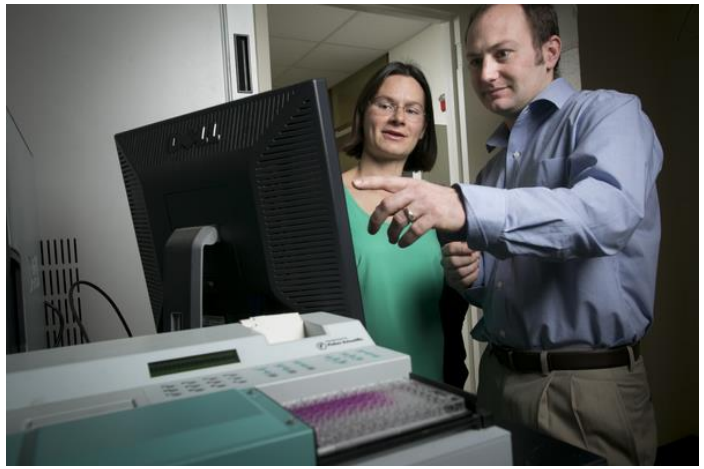

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