Tiered Mentoring & Training in Computational Biology Research

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Abstract
Continuing the exponential increase in scientific and medical breakthroughs directly depends on our commitment to teaching the next generation of independent researchers. The Computational and Systems Biology (CSB) department at the University of Pittsburgh is dedicated to providing cutting-edge research experiences and first-rate training to students at the high school, undergraduate, and graduate levels, through internal, intra-, and inter-institutional programs to train our students in the rapidly evolving and highly interdisciplinary field of computational biology. Our department has implemented a Tiered Mentoring and Training (TMT) framework, which provides students and trainees at multiple levels with numerous opportunities to learn from multiple faculty, postdoctoral fellows, graduate students, and other summer undergraduates from a variety of areas and perspectives. Primarily, our trainees and trainees in this framework come from a number of formalized programs such as the joint Carnegie Mellon—University of Pittsburgh PhD Program in Computational Biology (CPCB), the Training and Experimentation in Computational Biology (TECBio) Research Experiences of Undergraduates (REU) program, and the Drug Discovery, Systems and Computational Biology (DiSCoBio) Summer Academy, which is a part of the University of Pittsburgh Cancer Institute (UPCI) Summer Academy. These tiered interactions also provide important professional development opportunities for these early-stage and nascent investigators, who will be future teachers and mentors. Moving forward, we aim to expanding our TMT framework and increase our interactions with the wider scientific and local communities.

Some challenges facing outreach programs (esp. in medical schools) and strategies to address them

Challenges
University and Scientific Community Engagement
Interdisciplinary training requires a broad expertise.
Sustaining mentoring efforts with a small faculty.
Faculty availability often decreases in summer.
Limited/no credit in medical schools for mentoring and teaching.
Limited opportunities for trainees to mentor earlier-stage trainees
Non-University Community Engagement
Unfamiliarity with local schools, their goals, and how to engage them.
Need for more support from government, schools, and benefactors.

Strategies/Opportunities
University and Scientific Community Engagement
Recruit a deep and broad mentor pool from various institutions.
Involve earlier-stage scientists as mentors to reduce burden on faculty.
Include postdocs & students as mentors for their own professional development.
Maximize trainee learning opportunities through tiered mentoring and teaching.
Create a culture of mentoring to stress the importance of outreach to others.
Non-University Community Engagement
Actively engage partners at events and foster a network for science outreach.
Invite local politicians, teachers, and community leaders to students presentations.

Tiered Mentoring and Training Framework

Program Directors

Postdoctoral Fellows

Senior Personnel

Faculty

ROLES and DUTIES (working with Undergraduates)
• Primary research mentors
• Secondary career mentors
• Classroom instructors

ROLES and DUTIES (working with Undergraduates)
• Research project assistance
• Ethics Forum prep
• Seminar speakers
• Grad School preparation
• Workshop Presentations

• Grad school advice
• Research project help
• Ethics Forum prep
• Journal club prep & proctoring

BenEFITS for FACULTY & TRAINEES
• Getting to work with, advise, & inspire students interested in STEM careers
• Collaborative research opportunities with engaged and prepared students
• Multiple Networking opportunities
• Professional Development for trainees in:
  - running independent research programs
  - organization and leadership
  - mentoring younger scientists
  - undergraduate teaching

TECBio REU Students

CompBio Academy for High School Students

CompBio Academy

Computational Biology Academy

2018 TECBio REU Students

2018 DiSCoBio Students

The TECBio REU @ Pitt is funded by the National Science Foundation (DBI 1263020) & co-funded by the Department of Defense. The DiSCoBio Academy is a component of the University of Pittsburgh Cancer Institute (UPCI) Academy. TECBio thanks our partner institutions (CMU, Duquesne, Pittsburgh Supercomputing Center), faculty, postdocs, and grad students who help train our students. DiSCoBio thanks the UPCI leadership, Dr. Michael Lotze and Lindsay Surmacz, as well as the DiSCoBio directors, faculty, postdocs, and grad students who teach and mentor our students. Many thanks are also due to the past TECBio and DiSCoBio students who have helped shape and continue to inspire and motivate these programs.

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