



# Tiered Mentoring & Training in a Medical School REU in Computational Biology

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## Abstract

Computational biology incorporates interdisciplinary approaches and harnesses the power of computation to tackle emerging big data challenges and answer questions in biology not amenable to traditional experimentation. Given the interdisciplinary nature of the field, mentors in the TECBio REU @ Pitt program span a multitude of departments. The academic backgrounds of our students also reflect this wide range of expertise and include the major disciplines in the life, physical, and computer sciences, and engineering. This breadth of expertise is a boon for our emerging field as it presents opportunities for increased interdisciplinary discourse within our program. It also presents a challenge of how we can most effectively reach and maximize the mentoring experience for our students. To address this, we have begun utilizing a Tiered Mentoring and Training (TMT) framework into our program. TMT provides summer students with numerous opportunities to learn from multiple faculty, postdoctoral fellows, graduate students, and other summer undergraduates from a variety of areas and perspectives. These interactions also provide important professional development opportunities for these early-stage and nascent investigators, who will be future teachers and mentors. In turn, TECBio students also serve as mentors for a younger batch of high school students who participate in a parallel summer research program. We envision the formalization of a TMT framework as a means to more effectively reach an academically-broad group of students to enhance their experiences, and also as a means to lower the burden on faculty, without decreasing their interactions with students, and help recruit additional mentors, instructors, and others to participate in and augment undergraduate research-focused endeavors.

## Challenges facing REU programs (medical school REUs & others)

- Interdisciplinary research requires broad expertise in students and multiple mentors.
- Sustaining mentoring efforts year after year can be difficult for programs with small faculty.
- Some faculty availability decreases in summer.
- Limited/no credit is given in medical schools for mentoring and teaching undergraduates.
- Opportunities for REU students to mentor younger students are limited (esp. in SOMs)

## Strategies to meet challenges and Opportunities presented

- Recruiting a deep and broad mentor pool from various institutions and departments will enrich mentoring and teaching efforts.
- Involving postdocs and graduate students provides important training opportunities for these nascent scientists/educators.
- Maximizing involvement of additional scientists/educators in teaching and training will help reduce faculty burden.
- Interacting with multiple mentors and teachers offers numerous learning and networking opportunities for REU students.
- Creating a culture of mentoring and teaching (and having REU students serve as mentors) stresses the importance of these efforts.

## Tiered Mentoring and Training (TMT) Framework

### Program PIs & Faculty



other Pitt departments & institutions

Carnegie Mellon University  
Duquesne University  
Pittsburgh Supercomputing Center

Primary research project mentors  
Secondary career mentors  
Professional development  
Writing and presenting  
Seminar speakers  
Class instruction  
Career advice

### Postdocs



Research project assistance  
Proposal writing  
Journal club proctor  
Ethics Forum prep

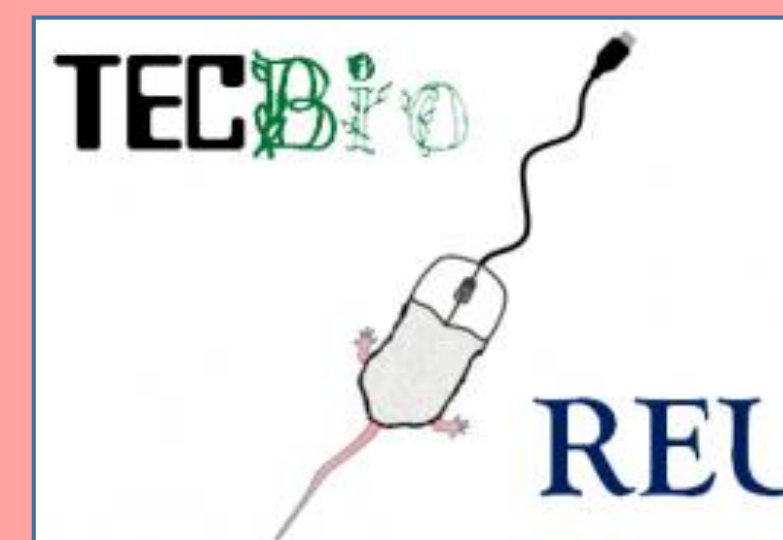
### Grad Students



CMU – Pitt  
Computational  
Biology  
PhD Program

Grad school prep advice  
Research project help  
Journal club prep  
Ethics Forum prep

### TECBio REU Students



Training and Experimentation in Computational Biology

## Acknowledgements

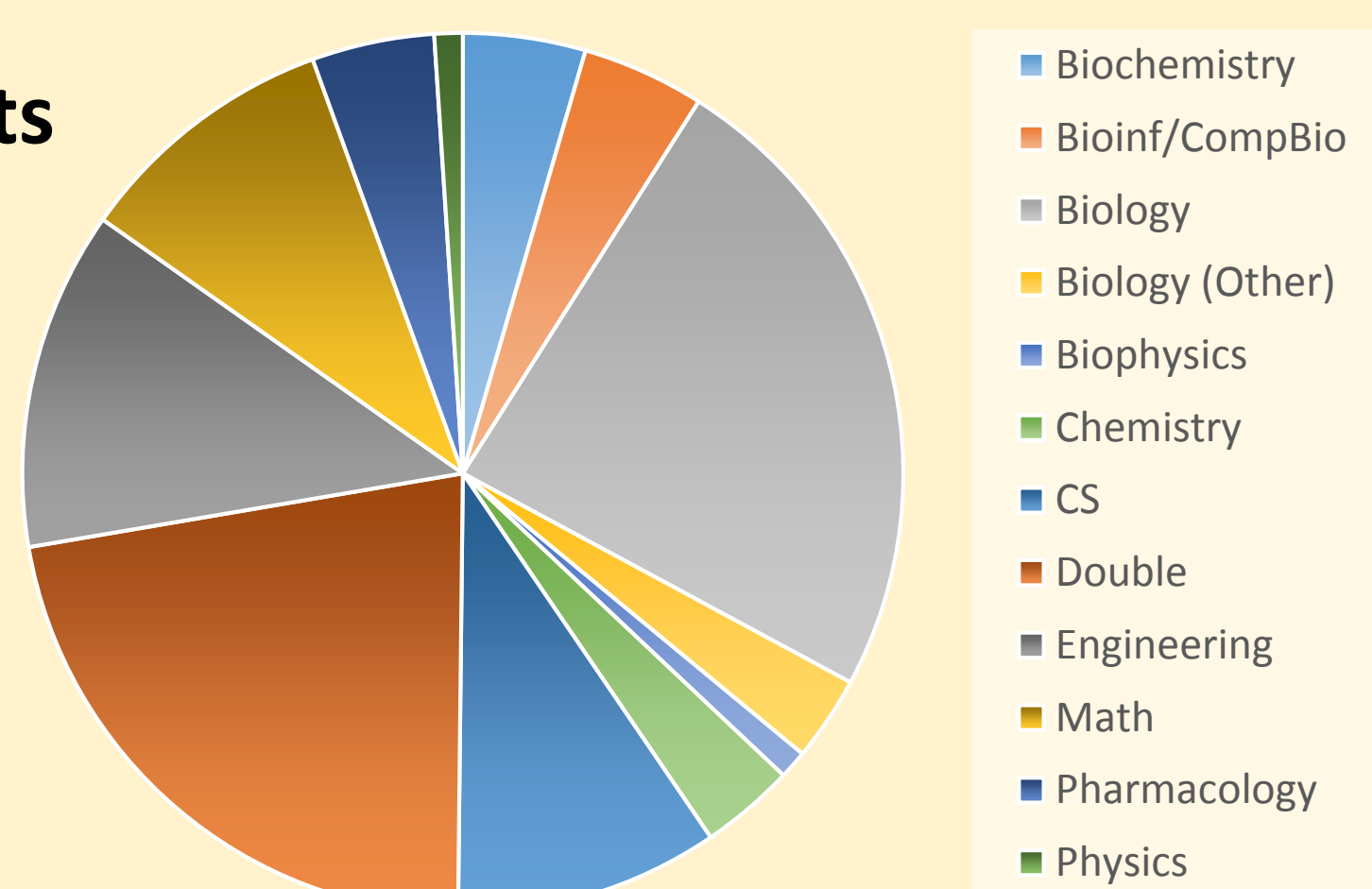
- The TECBio REU @ Pitt is funded by the Department of Defense & NSF (DBI 1263020).
- TECBio thanks our partner institutions (CMU, Duquesne, PSC), research mentors, postdocs, & grad students who help train our students.
- Many thanks to the past TECBio students who have helped shape our program.

## Implementation & Evaluation

- Potential model for enhancing training efforts & providing professional development opportunities for nascent scientists/educators
- Started recruiting for TMT in 2013
- Full Implementation & Evaluation in 2014
- Will evaluate and compare to previous years and other summer undergraduate programs..
  - awareness of and preparedness to pursue (interdisciplinary) STEM careers
  - benefits to faculty, postdocs, and students (graduate, REU, and high school)
  - number and usefulness of connections made by REU students
  - attitudes towards mentoring
  - other metrics...

## TECBio applicants/participants span many majors

### 2013 Applicants



### 2013 Cohort

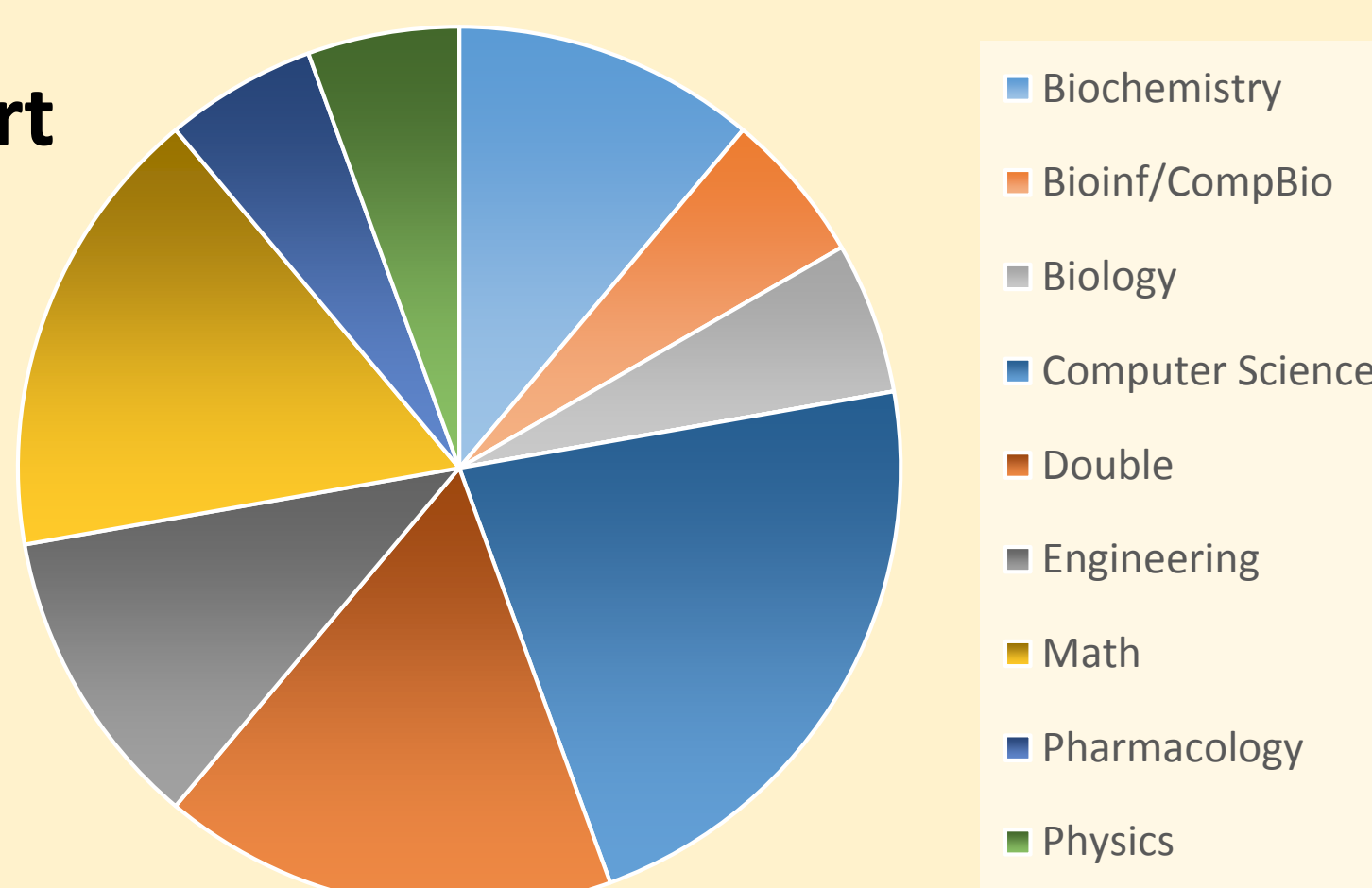


Figure 1. Charts showing the academic majors of TECBio applicants (top) and TECBio participants (bottom). Each individual discipline for double majors is also included separately in the bottom chart.

Classroom teaching  
Research project training  
Journal club preparation  
Research and career seminars  
Poster and presentation preparation

### High School Students - summer program



Drug Discovery - 8 wks; 6-9 students  
Systems & Computational Biology - 4 week overlap with TECBio - Similar to REU format

Other Summer Students

Ethics Forum  
Sharing experiences  
College prep advice  
Ethics training

