LIFT BIOINFORMATICS COURSE

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EXECUTIVE SUMMARY

01

Executive Summary

01

Problem

Undergraduates, especially underclassmen, in biology-based and biotech majors are unaware of the field of bioinformatics

02

Solution

A four week asynchronous course designed to introduce students to the tools and skills necessary for bioinformatics

03

Impact

More undergraduates will learn about the field of bioinformatics earlier in their college career

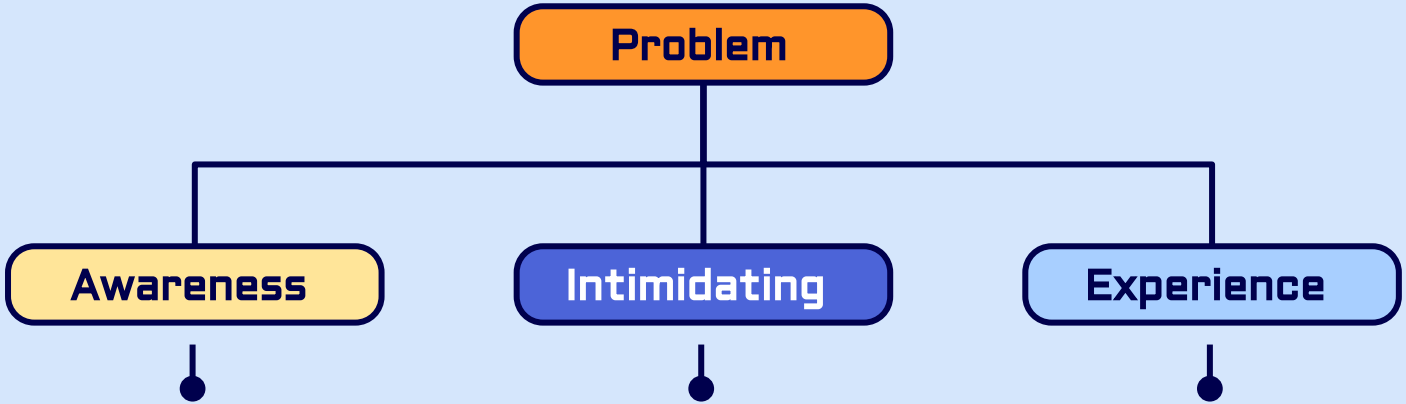
PROJECT BACKGROUND

02

Problem

Many incoming biology students are unaware of the bioinformatics field, despite its growing importance in research.

Problem Breakdown

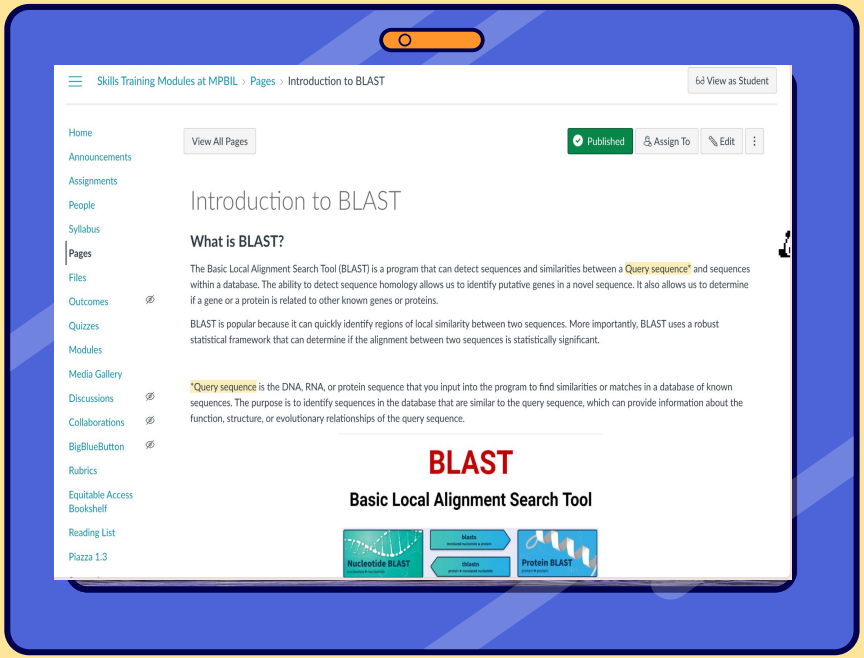


Some biology students may not be aware of the importance of computational tools for biology

Andrew, “students are intimidated by computers” Biology students might perceive it as overly complex

Limits their experience in the bioinformatics field as their unaware of the intersection of tech and biology

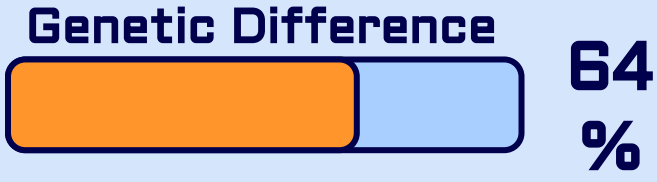
How has it been worked on so far?



- “Soft publish” of a blast module
- A quiz, step by step tutorial, hands on application, end of module survey
- Previous Surveys

Previous Survey Respondents(23-24)

Most people enjoy learning about biological structures, analyzing gene activity, and genetic difference



Prefer Canvas

NEVER used Pfam

Why Past work isn't sufficient

01

Short

One module about Blast was published

02

Engagement Issues

Lack Eye-catching titles that inspire people

03

Soft publish

Not used by the BIG-RT lab?

04

Unconnected

Doesn't define the broad scope of bioinformatics

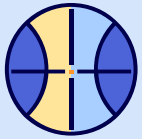
SOLUTION

03

VISION STATEMENT

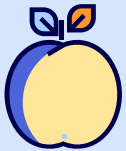
Empowering Students Through Hands on Bioinformatics

A 4-week bioinformatics course designed to engage students with mini-projects/case studies each week.



Develop very simple skills in data analysis, computational tools, and biological insights.

Focus on real-world applications to maintain motivation and practical understanding.



Bridge the gap between no knowledge of bioinformatics and application, preparing students for research or industry roles.

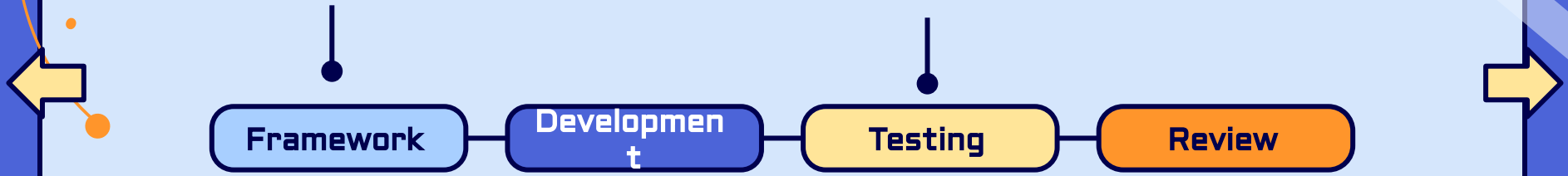
PROJECT SCHEDULE

Week 1-2

Course framework design, defining mini-projects.

Week 5-8

Testing projects, refining exercises, and designing assessments.



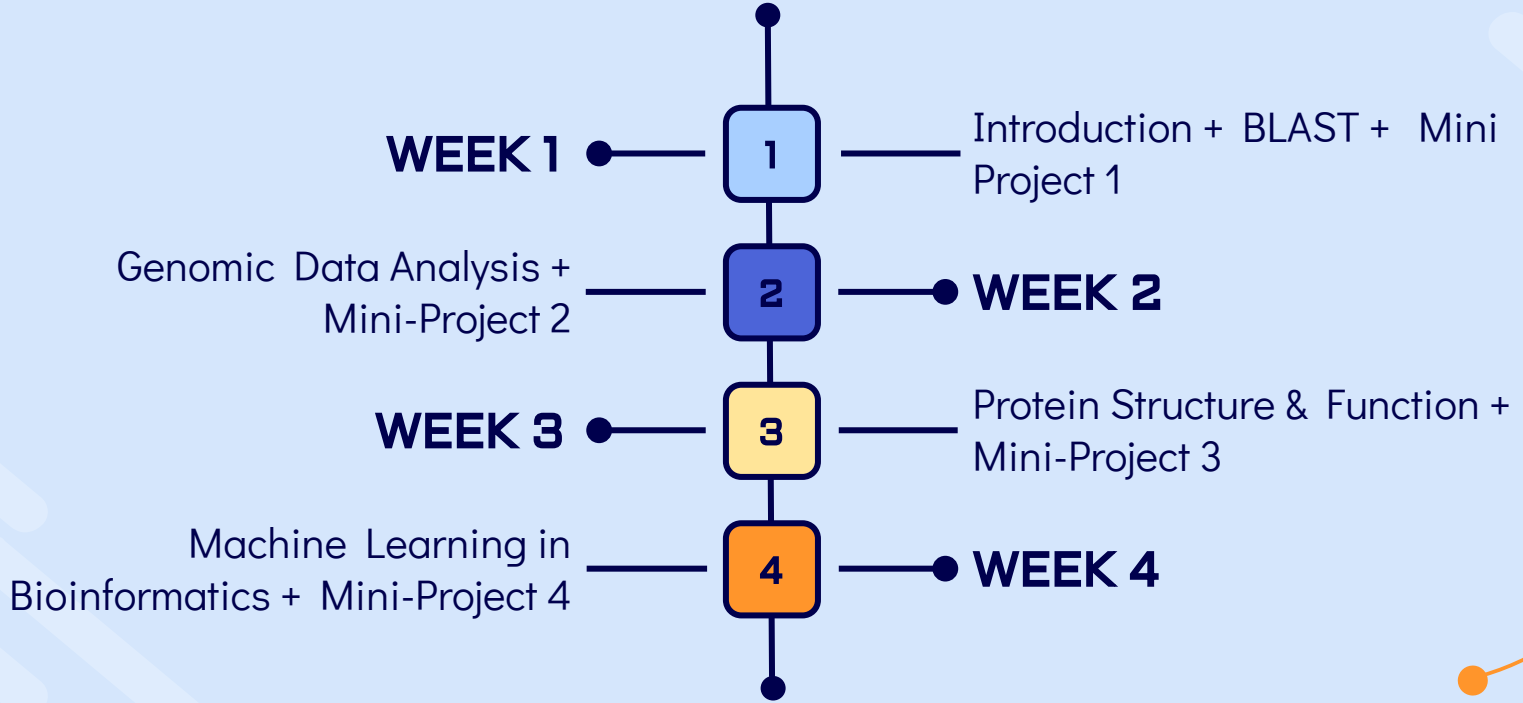
Developing instructional content and materials.

Week 3-4

Final review, feedback integration, and deployment.

Week 9+

COURSE SCHEDULE



ROLES & RESPONSIBILITIES

Course Developers

Designs syllabus, selects case studies, and creates content

Instructors

Provide guidance, deliver lectures, and lead discussions

Technical Support

Ensures computational tools and platforms are accessible to students

Assistants

Help troubleshoot issues and guide students through projects

Assessors

Develops grading rubrics and evaluates student performance

CHALLENGES & SOLUTIONS

Challenges

- Students with different programming backgrounds
- Computational Resource Constraints
- Engagement dropping overtime
- Students struggling with biological concepts
- Limited Instructors

Solutions

- Provide students with everything they would need to know in the course
- Can use programs built for all operating systems
- Use mini-projects milestones for motivation
- Incorporate visual aids into lectures
- Asynchronous delivery method

DELIVERY METHOD

SYNCHRONOUS

Weekly live Q&A sessions
Hands-on guided case studies

ASYNCHRONOUS

Recorded lectures and
step-by-step coding tutorials
Online discussion forums

PROJECTS

Students complete a
mini-project each week
Projects encourage
collaboration, exploration,
and problem-solving

INTERVIEWS

04

Bioinformatics Professor	Bioinformatics Core Members	Andrew Yao
• Engage students through case study format and hands-on learning • Introduce tools and show how to use them specifically for the project • Focus on biology students rather than CS students	• Focus on R and Command Line for lecture examples • Use Web-based tools such as Galaxy for hands-on learning • Time is too limiting to actually cover how to use command line/R • Encourage students to take further classes to perform actual bioinformatics work	• Convincing students that bioinformatics is not scary • Set learning goals for each module • Keep asking people for feedback during course formation • Target biology students to show the power of tech in biology

Main Takeaways from Interviews

Target Audience

Undergraduates, especially underclassmen, in biology-based and biotech majors

Course Format

4 case studies/real-life examples paired with hands-on projects to engage students in introductory course

Course Material

Web-based software for hands-on section and introduce Command Line at the end of the course

SURVEY

05

Survey Respondents

Year in College / Graduate School / Professor

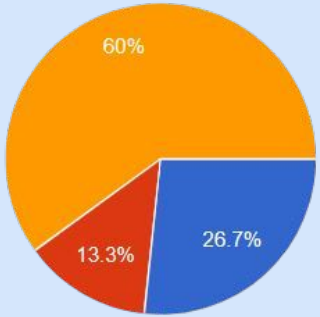
31 responses

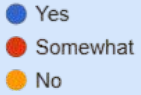
Survey Research Experience

Do you have any experience with Bioinformatics?

This could be in a class setting, lab setting or on your own.

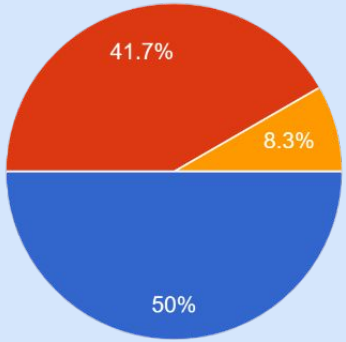
30 responses





How long have you been in a research team, journal club, etc?

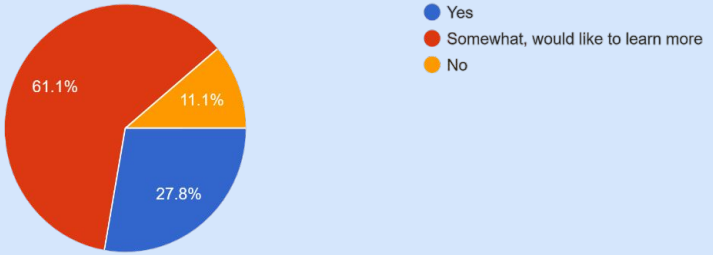
12 responses



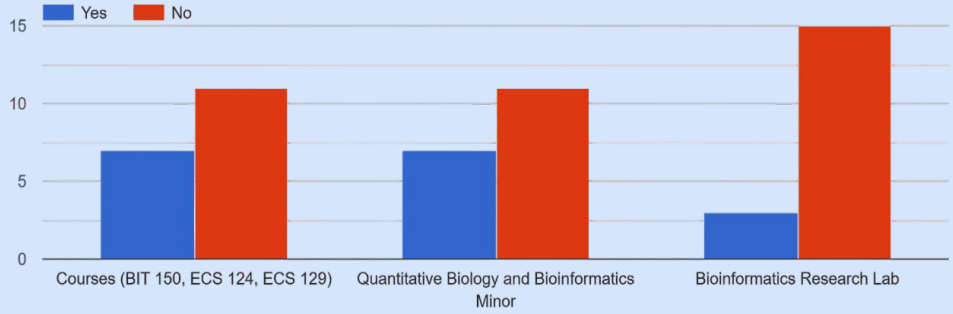
Bioinformatics Knowledge - No Exp

Do you know what Bioinformatics, as a field, is?

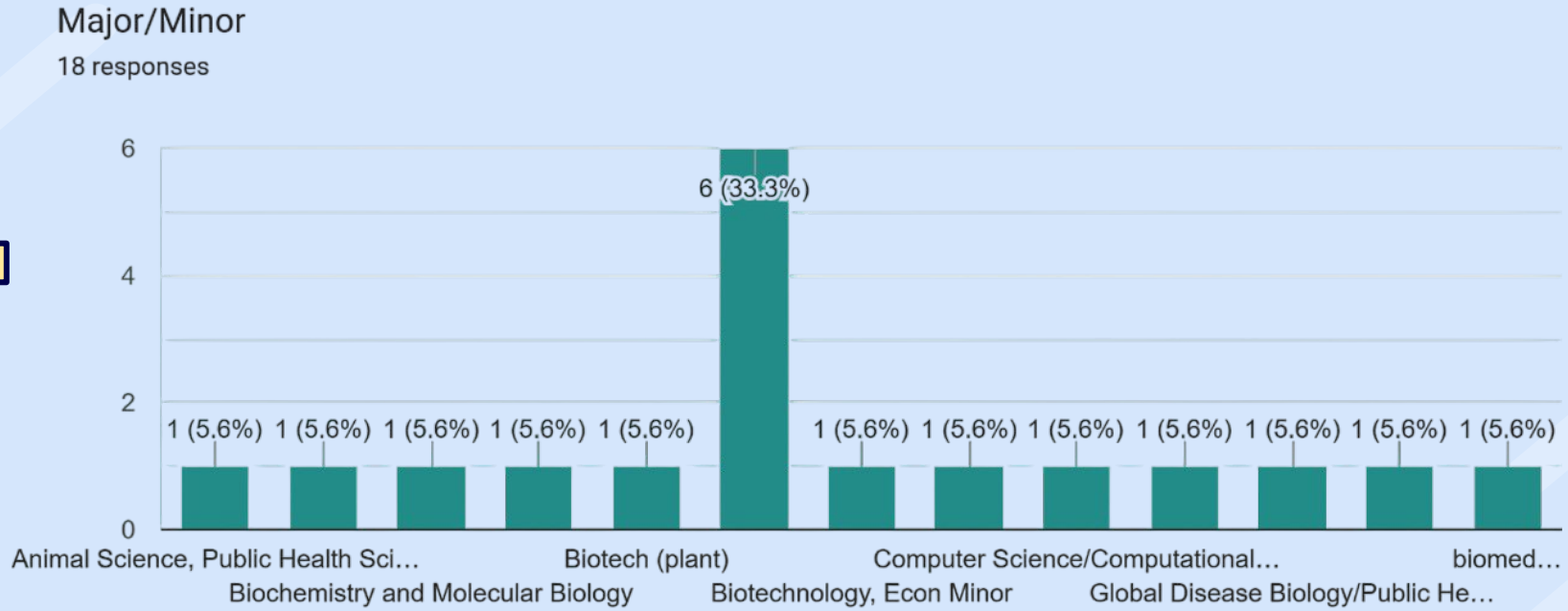
18 responses



Have you heard of these opportunities to work with Bioinformatics at UC Davis previously?



Majors - Undergraduate No Experience



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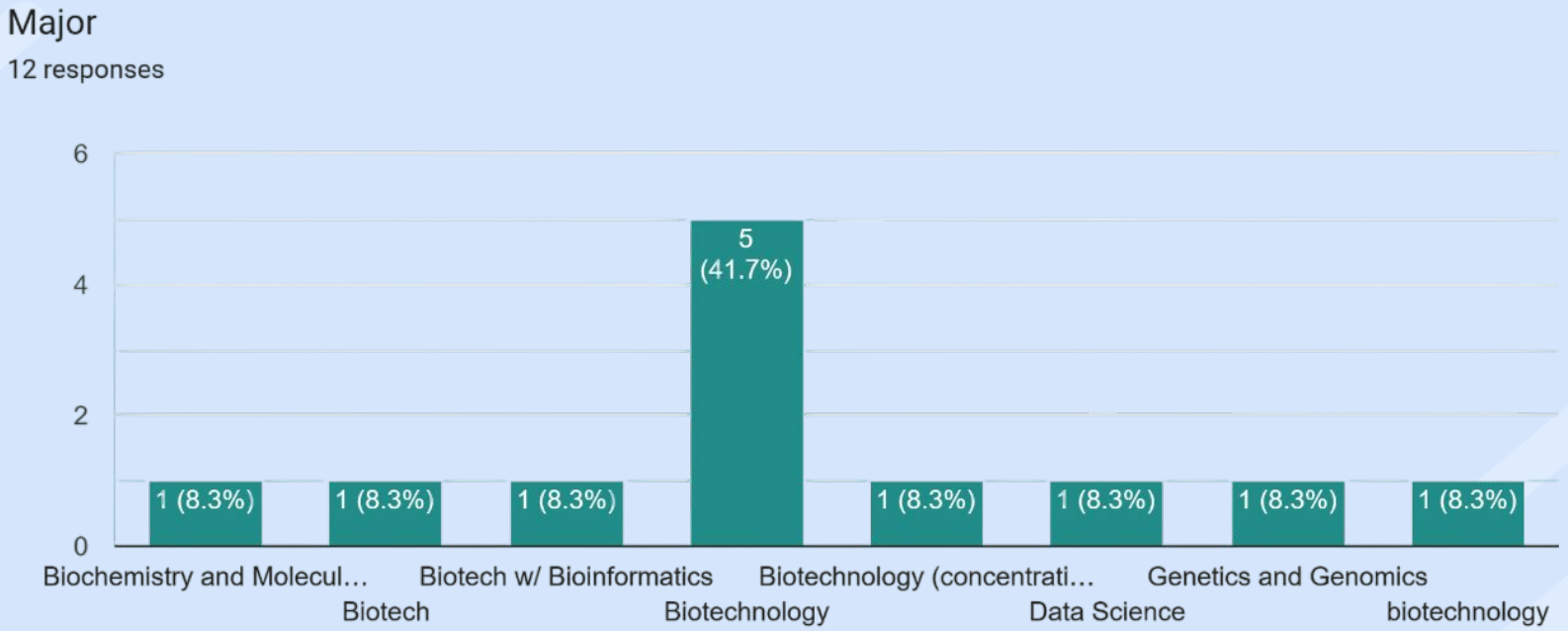
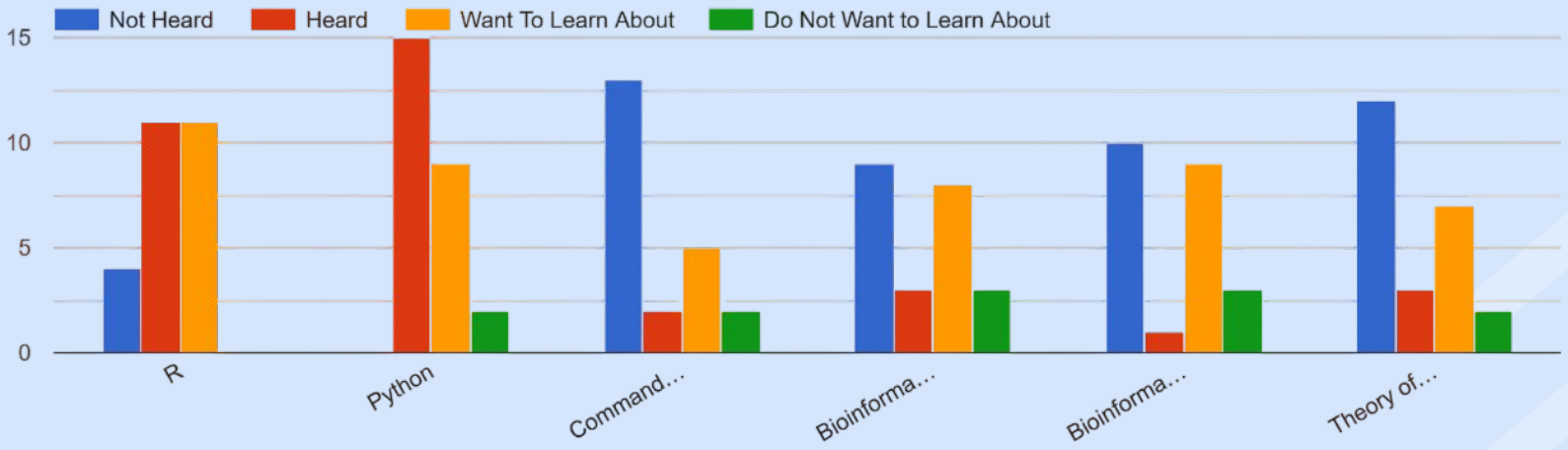


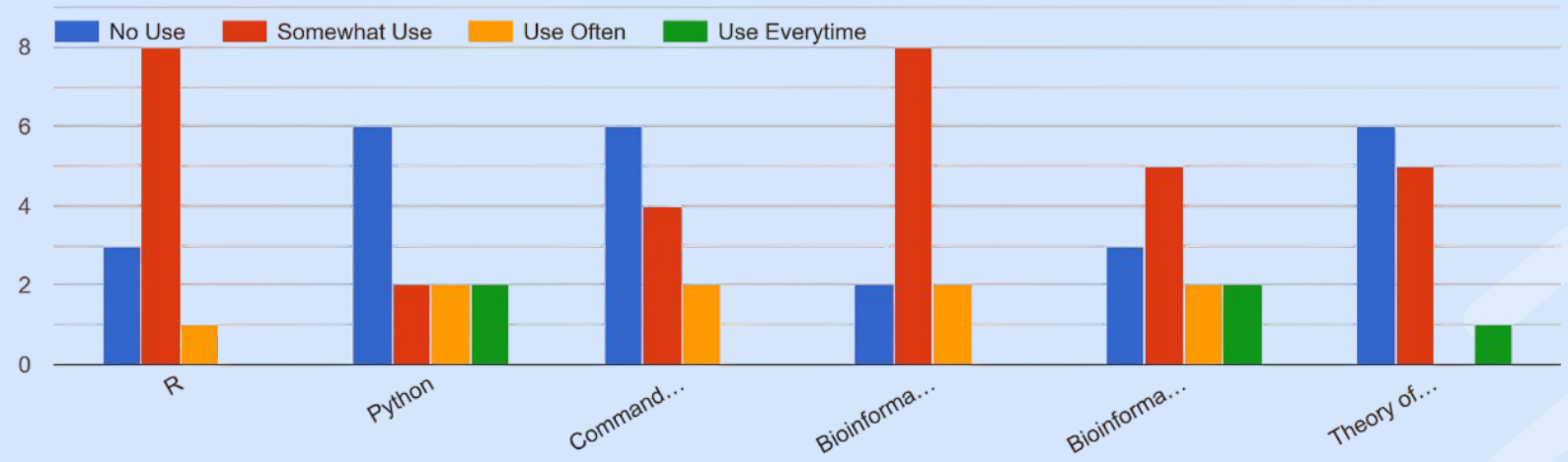
Bioinformatics Tools - Undergrad No Exp

What Bioinformatics tools have you heard of/would like to learn about?



Bioinformatics Tools - Undergrad Exp

What aspects of Bioinformatics do you use in your research?



CONCLUSION

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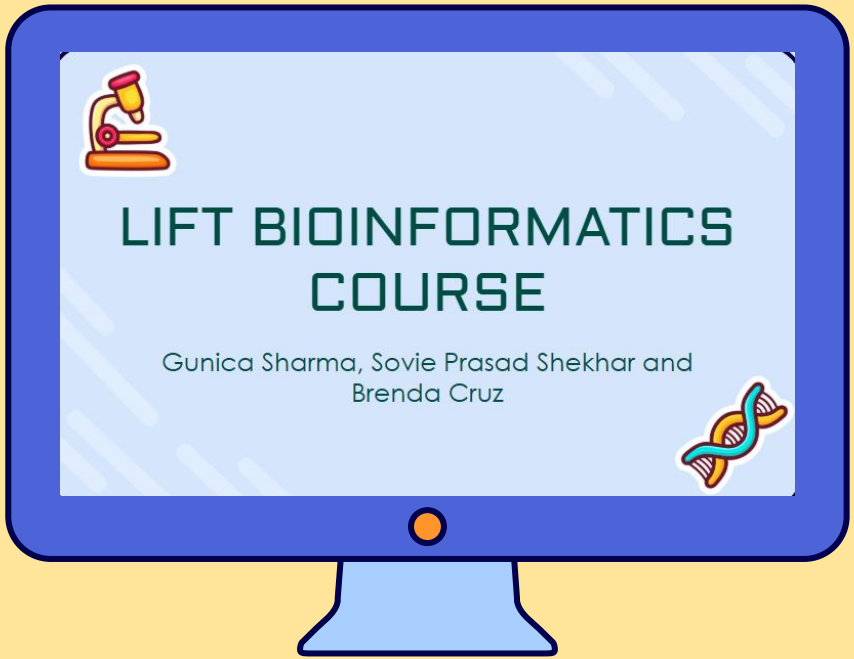
Conclusion

In order to combat the **lack of awareness of the bioinformatics field** in undergraduates, we have designed **a four week asynchronous course** to give a **"taste"** of the field by introducing necessary tools and skills. If students enjoy their "taste", they can actively take steps to take a bigger **"bite"** and **pursue bioinformatics further.**



THANK YOU FOR WATCHING!