

Modernizing the Stony Brook Computer Science Curriculum



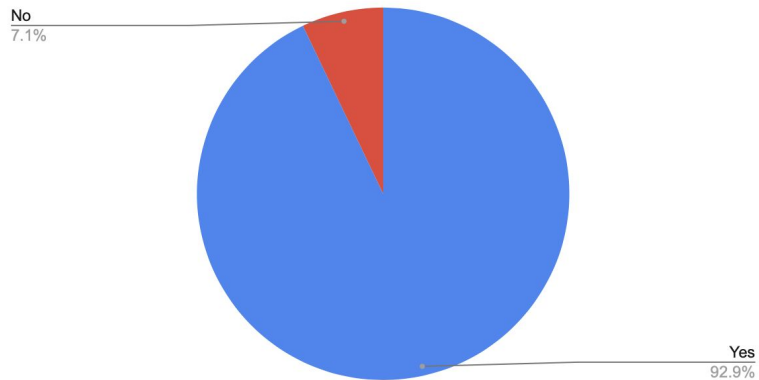
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Problem to be addressed?

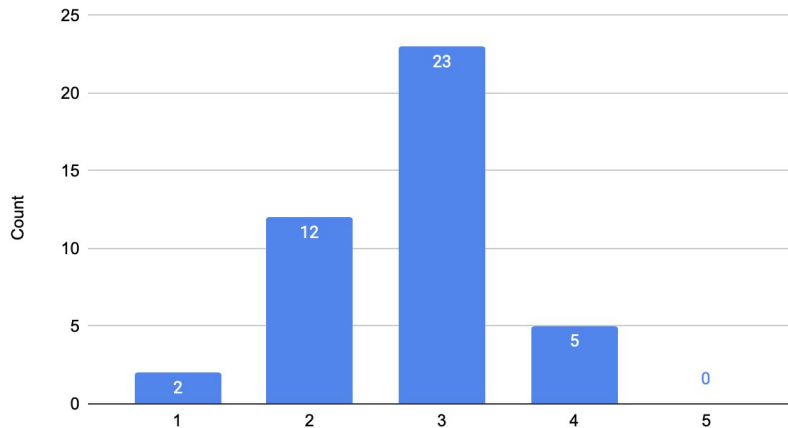
- Today's SBU CSE curriculum expose students to a variety of subjects in different concentrations of Computer Science
- Issue: Curriculum is not up to date with current industry standards to prepare students for real world jobs
- Importance: in a fast paced changing industry, keeping up with current trends is the best way to excel

The Numbers - 42 Responses

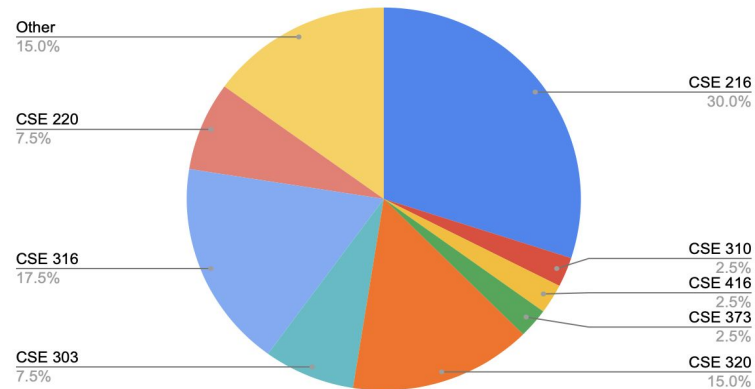
Do you think the content being taught in the classes today can be improved?



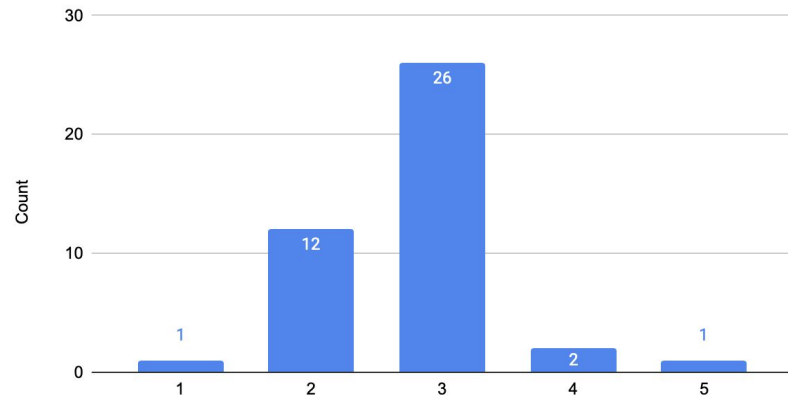
How satisfied are you with the current curriculum?



Courses that Students Feel Need to be Updated



How well do you think the content in the current classes prepare you for the industry?



Stack Overflow Developer Survey 2022



Which programming language have you done extensive development work in the past year and which do you want to work on over the next year?

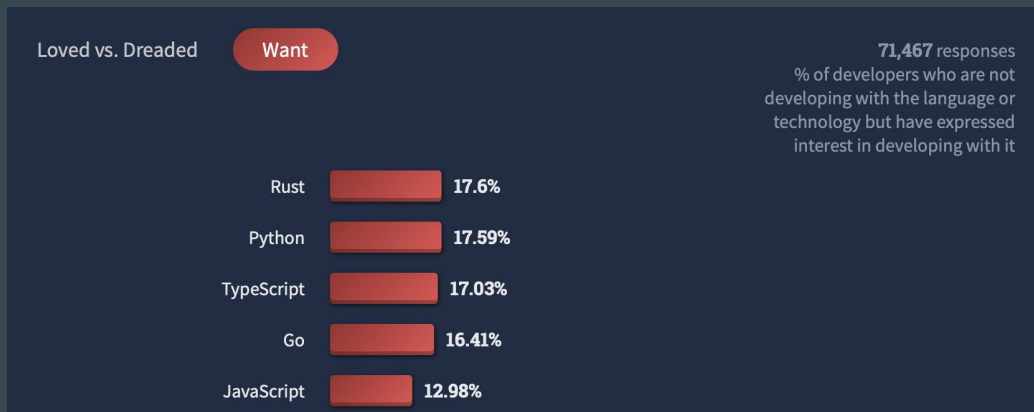


Which other frameworks and libraries have you done extensive development work for in the past year?

Stack Overflow Developer Survey 2022



Which web frameworks and web technologies have you done extensive development work in over the past year and which do you want to work on over the next year?

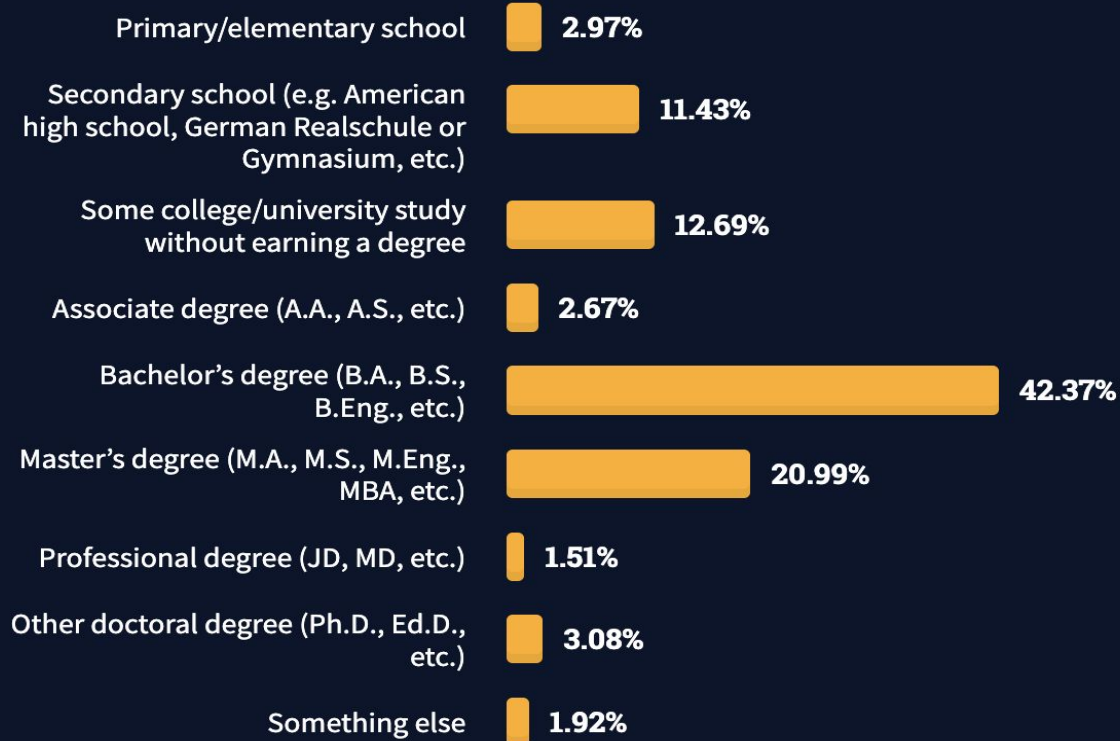


Which programming language have you done extensive development work in the past year and which do you want to work on over the next year?

All Respondents

Professional Developers

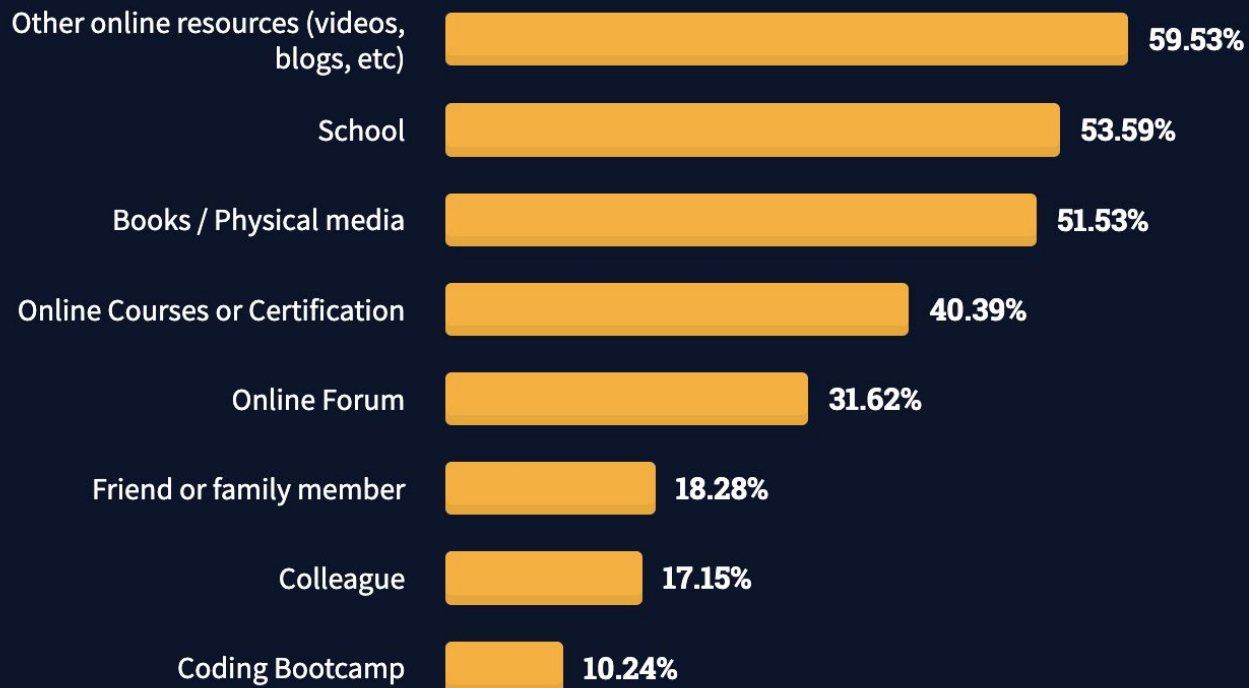
83,439 responses



All Respondents

By Age

82,963 responses



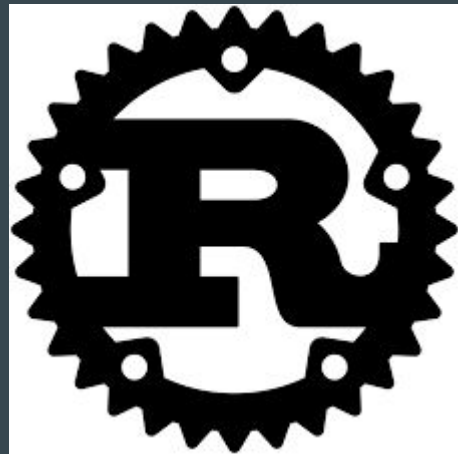
CSE 216 Programming Abstractions - Overview & Issues

- Course overview: Intermediate-level programming concepts and paradigms (OCaml, Python, Java Streams)
- Reasons for updating the course:
 1. Evolution of programming languages and paradigms
 2. Growing importance of newer languages and frameworks
 3. Shift in industry demands and expectations



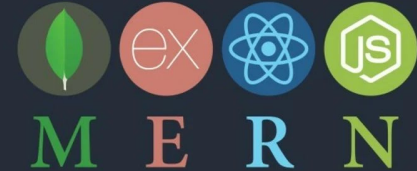
Proposed Improvements & Real-World Applications

- Update programming languages: Replace OCaml and Java Streams (e.g., JavaScript, TypeScript, Rust)
- Focus on in-demand concepts: Asynchronous programming, microservices, containerization, etc.
- Include project-based learning: Real-world problems for hands-on experience
- Teach software testing methodologies: Unit testing, integration testing, end-to-end testing, and test-driven development (TDD)



CSE 316 Fundamentals of Software Development- Overview & Issues

- Course overview: Event-driven programming, information management, software design principles, CI/CD, secure distributed computing
- MERN stack (MongoDB, Express, React, Node.js) is used
- Reasons for updating the course:
 1. Rapid changes in web development technologies
 2. Evolving best practices for design patterns and secure coding
 3. The rise of alternative stacks and new front-end frameworks



Proposed Improvements & Real-World Applications

- Introduce alternative stacks: e.g., MEAN (MongoDB, Express, Angular, Node.js) or Python-based (Django, Flask)
- Part of RIT curriculum
- Used by LinkedIn, IBM and Netflix
- Update software design principles: Emphasize domain-driven design, microservices architecture, and API design

Job Board	React	Angular
LinkedIn Jobs	154,264	136,600
Monster.com	11,316	14,335



Solution

- Who do we talk to?
 - Kevin Mcdonell (CS Undergraduate Program Director)
 - Course Coordinators for respective classes (216 Fodor, 320 Zadok, 316 Dr.Ramakrishnan)
 - Professors of respective classes. (216 Banerjee, 316 Mckenna, 316 Mitra, 320 Stark)
- The cost of this?
 - New textbooks, online resources, and other course materials may need to be purchased to support updated courses.
 - As technologies and programming languages evolve, the software and hardware needed to teach them may need to be updated
 - Faculty/Staff potential costs (Training, curriculum development, salaries).
- Why it's worth the cost?
 - Modernizes the curriculum with current day technology.
 - Helps students become better prepared for the workforce.
 - Students would be more satisfied with the curriculum leading more students to choose SBU.
- Challenges faced while implementing solution
 - Convincing professors to implement new technology.
 - Allocate resources in order to be able to meet potential costs.

Conclusion

Having a more dynamic computer science curriculum at SBU would have numerous potential benefits that would outweigh the costs and rigors associated with implementing one. It would help ensure students are prepared for potential roles in their future. This can be either internship opportunities while being enrolled or full time roles after students graduate. By updating the curriculum students with more modern technologies students would be better equipped to thrive in their respective careers. Additionally, SBU would benefit as more students would be satisfied with the quality and relevancy of courses which would help the CS Undergraduate Program reputation as a whole. This can help attract and retain students while being able to stay relevant and responsive to the needs of the rapidly changing tech industry, and position them as leaders in the field.

Works Cited

- <https://sites.google.com/cs.stonybrook.edu/cse216/>
- <https://www.cs.stonybrook.edu/students/Undergraduate-Studies/courses/CSE216>
- <https://survey.stackoverflow.co/2022/>
- <https://www.cs.stonybrook.edu/students/Undergraduate-Studies/courses/CSE316>

Questions

