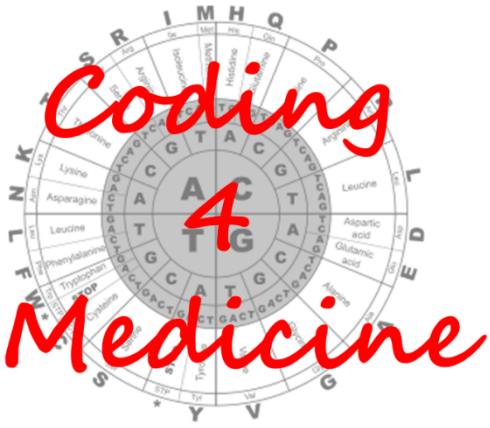

https://hs.coding4medicine.com

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A futuristic STEM Enrichment program for High Schoolers at the confluence of computer science and biomedical sciences

In Brief

‘Coding4Medicine’ is training the next generation of top-notch biomedical scientists in BIOINFORMATICS, an in-demand 21st century STEM skill merging computing with medicine and life sciences. As digital technologies significantly disrupt healthcare and transform biological and clinical research into a large-scale data-driven science, bioinformatics is increasingly playing a central role in research and industry.

We are the leaders in this field with over 15 years of technical experience and top-quality publications in scientific journals. We are also the writers of the cutting-edge blog Homolog.us: Frontier in Bioinformatics (https://homolog.us).

Starting in 2015, three years in a row, we have organized our High School STEM summer program called ‘Bioinformatics-Coding For Medicine’ on Seattle’s eastside. By 2017 summer a record 70 students have passed through our program.

In 2017 we expanded our high-school summer course to Houston, TX- the hot-bed of medicine. We plan to expand and bring more innovative programs in bioinformaticsfor high-schoolers in and around the country in partnership with schools and STEM teachers.

Mission

Empowering BIOMEDICAL SCIENCES for the DATA age

Our current lives have been greatly impacted by advances in computing, software, automation and other high technologies. These advancements are also disrupting biomedical research and medicine at an amazing pace. **One of the most significant advances is the rapid drop in the price of DNA sequencing.** In 2003 the draft sequence of the human genome was released at a staggering price of $1 billion. Today that price is fast approaching $1000 for genome sequencing.

The ease of acquiring genome-scale data is of unusual significance. Genomic data is transforming biological and clinical research, drug development and clinical trials, diagnostics and is central to massive billion dollar digital health and personalized medicine industries. Beyond medicine it will also disrupt agriculture, food industry and as well as create new ways of environmental monitoring.

Large scale data is the new gold in biomedical sciences. B**iology, once an entirely lab-based scientific discipline is now a data-intensive field. Unfortunately few biologists or clinicians are trained to handle large-scale data themselves and few computer scientists understand the biological questions raised for meaningful parsing of such data.** This can severely impact future progress in the biomedical sciences which holds the key to human health, food and our environment.

Our mission at **Coding4Medicine** is to bring biomedical and life sciences into the data age by developing and delivering essential and meaningful bioinformatics training to biologists on a global scale. Our training will enable the biomedical scientist to confidently implement computational skills toward answering challenging biological questions. We are opening the doors of the exciting possibilities in bioinformatics to today's high-schoolers contemplating future careers in medicine, biology or computer science. Our state-of- the art training and enrichment program in the biomedical sciences will provide one of the most in-demand, transformative skills needed in STEM.

About Us

"We are at the very beginning of time for the human race. It is not unreasonable that we grapple with problems. But there are tens of thousands of years in the future. Our responsibility is to do what we can, learn what we can, improve the solutions, and pass them on."

Richard P. Feynman

Coding4Medicine (https://hs.coding4medicine.com**)** is a bioinformatics knowledge-base company in Redmond WA. Founded by **Drs Mohua Bose and Manoj Samanta,** we passionately strive to inspire new generations of students to approach the biomedical sciences through the eyes of a computational scientist. It is our hope this new angle of training and education will spur the next discoveries and innovations in biology that is so critical to human health, agriculture and environment. In the digital age, computational skills will be central to all future advancements in biology and medicine.

Manoj is an International Maths Olympian, an Institute Silver Medalist at India's premier Indian Institute of Technology (IIT) and is a PhD in Electrical Engineering from Purdue University. He has worked at Hewlett Packard and NASA. He brings his wealth of cutting-edge computational and bioinformatics expertise to Coding4Medicine classroom and online programs.

Mohua has an extensive breadth of research and scientific experience at the interface of chemistry and biology . A PhD in organic chemistry from University of Nebraska, Lincoln she worked on cutting-edge research problems at The Scripps Research Institute and Stanford University School of Medicine. She developed low-cost diagnostics for infectious diseases at InBios International, Seattle and now consults in medicinal chemistry and drug discovery with Prediqtus in Columbus, OH. Mohua organizes and promotes Coding For Medicine programs, and engages with the high school student STEM organizations.

Summer Program: A 3-year review

Our website is https://hs.coding4medicine.com/

This website details all our **Summer Programs** and the newly formed **Membership Section** which is under active development. The membership section will bring the wealth of our programs in an online format to biology enthusiasts anywhere.

Key highlights :

Starting off in 2015, this has been the year 3 of our summer program on Seattle's eastside. Starting with a small group of 7 high schoolers in our first year, **we have now about 75 students who have trained in our Bioinformatics course** by the end of summer 2017.

In summer 2017 **our course was supported by Mercer Island School District and was offered exclusively to the district's high schoolers at the Mercer Island High School itself.**

2017 was also the year when **we received our first international high school student from Philippines** who spent part of her US holiday joining our course. She is preparing to be part of the first ever team from Philippines to participate in the International Biology Olympiad.

In 2017, Coding For Medicine **offered its first out-of-state summer course on Bioinformatics to high schoolers in the Houston area.** As the hot-bed of medicine and biomedical research Houston was an apt choice.

In 2016, our course attracted the attention of students and parents of high-schoolers beyond WA state. One of our sessions was joined by our very first out-of-state student who came from Desert Vista High School from Tempe, AZ.

For the third year, **we continue to offer the summer enrichment course in partnership with the Washignton Student Science Association (WSSA),** a wholly student-run non-profit organization that brings STEM events to all students in WA.

Classroom

Our summer program called **Bioinformatics-Coding For Medicine** is an instructor-led two week session (10 working days) in a Wifi-connected classroom. The two-week course is run on the premises of Bellevue College in Bellevue, WA in the months of July and August.

We maintain small class sizes of 10-12 students despite the increasing enthusiasm of enrolling for our programs. Both in 2016 and 2017, our summer sessions were filled to capacity in the Seattle area.

All our classrooms are now supported by Teaching Assistants in addition to the instructor. Our TAs are recruited from a pool of highly motivated undergraduate students. In 2017 a computer science undergrad of Gonzaga University was the TA and in 2016 a biology undergraduate from UC Berkeley joined as the course TA. Their presence enhanced the quality of the learning experience forin our classroom.

The course introduces modern data-intensive biology to high-schoolers. All through the course students learn to integrate the knowledge in biology with skills in coding, maths and algorithms. During the course students receive training in Python programming and uses it in context of analyzing genomic data. Students learn translating nucleotide to protein sequence, genomic alignments, commonly used bioinformatic tools like BLAST, MUSCLE and others. They also learn to navigate and use complex biological databases used by researchers. An Advanced Course was offered in 2017 for the first time focused on genome assembly and geneology. This was a project-based curriculum.

We have now set-up an online training site for high-schoolers in bioinformatics. The online site is accessible here :

https://hs.coding4medicine.com/Members/users/sign_in.

At present registration is free to all. The site contains tutorials and will also include requisite server access for training in BIOINFORMATICS.

Testimonials

Excellent and constructive feedback from both students and their parents continue to guide our programs such that we can create a valuable learning experience for our students.

From Educators and Professionals:

2017

- Congratulations for running this very important program for kids to learn.
- It's offers like this that make we wish I was back in high school! Rest assured that I will make this known to our students.
- Thank you for being the most supportive and patient and understanding person to work with this year. I will follow up with the students for feedback but, what I've heard so far, they had a very rich experience.

From Parents:

2017

- Thank you so much! Pavel really enjoyed the course and was very motivated and curious about the content. He did not have any previous coding experience and enjoyed it immensely.
- Max really enjoyed this class. I heard about it with enthusiasm every day…..
- Thank you for organizing the camp and Dr. Samanta for teaching the kids interesting bioinformatics knowledge. My son Favian enjoys the camp.
- My son enjoyed the advanced course a lot and was talking about it at home (unusual).
- I am very glad that Sasha took the class and she seemed to like it. She has had very little computer experience up until now (one other summer camp experience) and I think it was an excellent prelude to the AP Computer Science course that she will be taking her senior year at [redacted] School. Now she is not going into that "cold". Also, she is very interested in biology and genetics, so the class was a very good experience for her. ----- Thank you!
- Jeremy enjoyed the camp and thought it was a great experience :)
- Really interesting class with focus on exposing kids to emerging fields to explore and think of for future educational and career choices.
- The exposure was wonderful for Brian.
- Very well organized and communication was really good.

- Liked the challenge of solving the problems.

2016

- Thank you so much for teaching such a wonderful class! Every day Brianna has told us about the things she is doing with an excitement and understanding that is really impressive. She is learning such amazing skills, as well as why they are useful and important. Thank you for sharing your knowledge and enthusiasm for data science with these young students!
- We were really happy to see a dedicated individual do this for the same of the genuine interest and in the process influence the younger generation towards solving important and tough problems.
- I just want to say "thank you" again for this wonderful camp. Andrew has learned and practiced a lot, and we all felt fantastic to work with a real scientist -- not only learning the knowledge but also learning how to plan and conduct a research! It is especially touching that both of you have enthusiasm about educating young students.

Student Feedbacks at end of course:

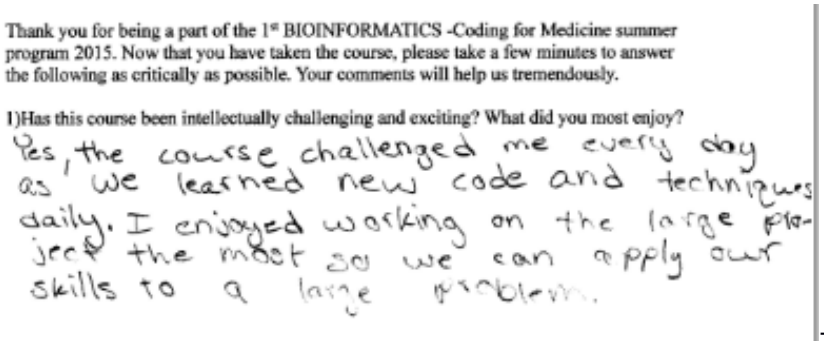
2017

- Yes I most enjoyed programming challenges in Python and how it connected to bigger projects (like RNAse P).
- It was challenging and exciting and I enjoyed incorporating genomes into the programming.
- Its more meaningful than pretty much anything else available to HS kids. Excellent!
- Yes It seems to be an incredible new field with countless things to research.
- I loved the assembly of genomes and just coding and learning more about genetics.
- I have previously looked at coding from a video game perspective but now I see other uses for coding.
- It was really Challenging and I loved the part when I finally found the solution.
- I really enjoyed learning about new technologies like CRISPR and organoids.
- I was interested in coding and biology and I took basic bilogy abd cding in school . I wanted to go more in depth and this course has made me even interested in the fields.

2016

- “This class has gotten me re-excited about coding mostly but biology is also super-cool”-BP (8th Gr)
- “Bioinformatics has piqued my interest because I did not realize how computer programming and biology go hand in hand”- MF (9th Gr)
- “It has piqued my interest because I was comfortable with biology but being able to learn programming while applying it to biology was a terrific experience” – JN (11th Gr)
- “I found the class challenging and interesting! I loved the debate and biology research pieces and Burrows-Wheeler puzzles” – RH (9th Gr)
- “I enjoyed the learning experience in the biology area so that it could prepare me for my upcoming sophomore year”- AA (9th Gr)
- “I most enjoyed learning about the several different applications to modern biological issues with the knowledge of coding and analyzing genes” -AR (8th Gr)

2015


Thank you for being a part of the 1st BIOINFORMATICS -Coding for Medicine summer program 2015. Now that you have taken the course, please take a few minutes to answer the following as critically as possible. Your comments will help us tremendously.

1)Has this course been intellectually challenging and exciting? What did you most enjoy?

Yes, the course challenged me every day as we learned new code and techniques daily. I enjoyed working on the large project the most so we can apply our skills to a large problem.

-VC (9th Gr)

- ✔ Yes ! Although programming may not be my thing, this class reinforced the fact that I really want a scientific career.- MS (11th Gr)
- ✔ I was surprised by the amount of coding needed for this class. It was not difficult but I had no idea how important a role computers played.-YS (10th Gr)
- ✔ Yes, I love this course. I will definitely recommend to someone interested in this field.- JC (11th Gr)
- ✔ Yes, it has. I have developed skills in coding and programming that I can use for jobs and internships. -GC (11th Gr)

Contact Us

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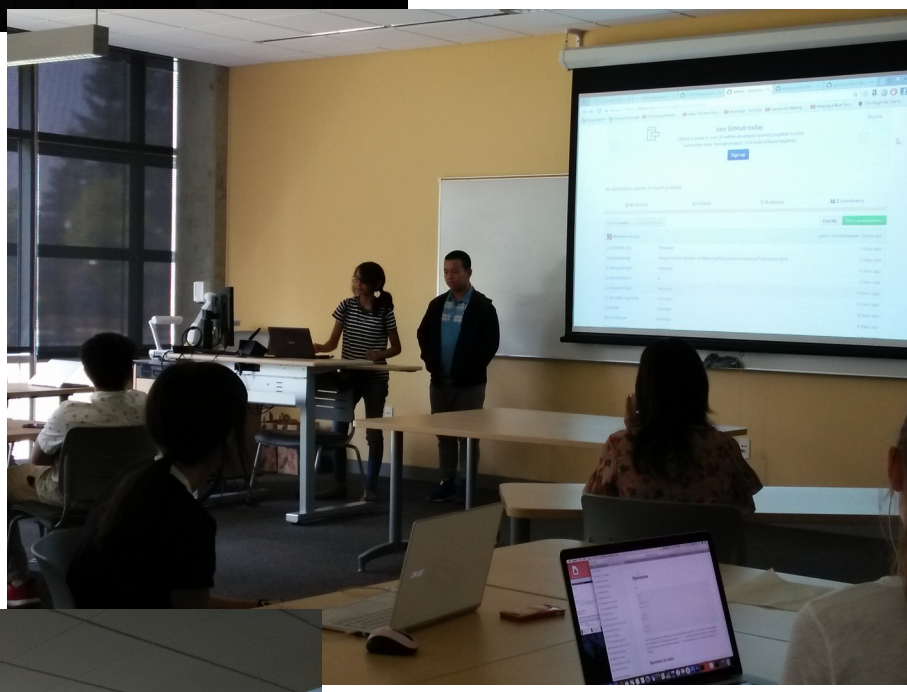
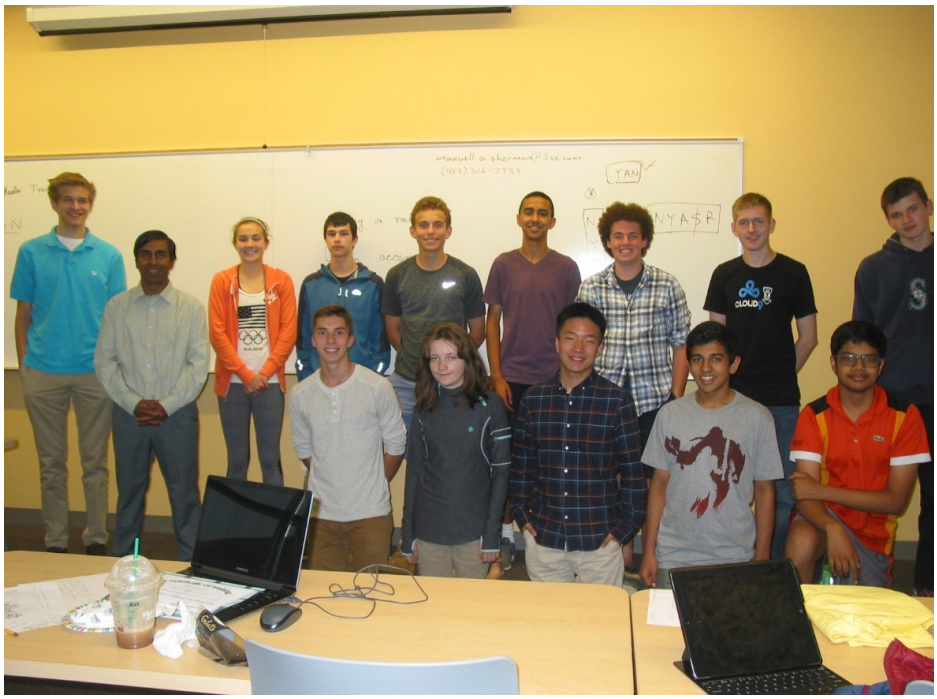
During summer course in Houston at lunch break, June 2017

Advanced Course students at Bellevue College, Bellevue, WA in August 2017

Students presenting their work on the last day during course round-off with parents, at Bellevue College, 2017.



Summer 2016



Class of 2015 (our 1st year)