Metrics	Numbers / Data
Students engaged in school sessions	**250+ students at Rustomjee Cambridge School**
Participants in BioQuest competition	**1,500+ students registered from across India**
Finalists mentored during BioQuest	**60 students**
Viewers of BioQuest Grand Finale	**2,500+ viewers online**
Entries in overdose awareness contest	**35+ essays and posters**
Rural students reached	**10th-grade students at Shri Shivaji Vidyalaya (approx. 150 students)**
Social media reach (approximate)	**Thousands of views on reels, posts, and videos**
Awards and recognitions	**Multiple publications in Rubisco journal.**

Drug Awareness Campaign

- **Date: June 26, 2025**
- **Location: MIT World Peace University, Pune**
- **Impact: Prevention of drug use in young adults.**
- **Link:** https://www.instagram.com/reel/DLr0gAHBC_1/

Summary: **Our team led a campaign during Drug Awareness Day to spark conversations on drug abuse, peer pressure, and support systems. Through student-led interviews with participants and insights from faculty, we created impactful reels and interactive sessions that emphasized empathy, prevention, and the importance of seeking help through initiatives like Nasha Mukti Abhiyan.**

Report: As part of the iGEM MIT-WPU Bharat team's Education & Outreach efforts, we designed and implemented a Drug Awareness Campaign to educate the public about the dangers of drug use, the influence of peer pressure, and the importance of seeking help through government programs like Nasha Mukti Abhiyan.

Our team members - Arya, Sharvari, Meetrayu, and Animesh - conducted interviews with students, faculty, and random participants to understand public perceptions of drug addiction. These interviews were then transformed into short, engaging reels addressing questions such as:

- "What is drug addiction?"
- "Do addicts deserve punishment or help?"
- "What role does peer pressure play?"
- "How would you help a friend struggling with addiction?"

To strengthen the scientific and clinical context, our faculty member, Dr. Kausik Bhattacharya, contributed insights on opioid use, the risks of easy accessibility, the role of parents and schools in awareness, and the importance of support over punishment.

The campaign also provided practical resources, including government helpline numbers, making the information actionable for those in need. By combining student-led content, faculty expertise, and accessible public resources, the campaign fostered meaningful discussions on prevention, mental health, and societal responsibility, highlighting that drug addiction is not merely an individual issue but a challenge that impacts families and communities.

Through creative use of social media, interviews, and short-form content, this initiative reached a wide audience and encouraged reflection, conversation, and proactive engagement, aligning with iGEM's Gold-level criteria for Education & Public Engagement by:

1. Presenting a scientifically-informed and societally-relevant issue.
2. Reaching a diverse audience through innovative content formats.
3. Demonstrating measurable impact via interviews, reels, and community engagement.
4. Ensuring actionable outcomes, like awareness of helplines and government initiatives.

This campaign exemplifies how iGEM teams can combine science, education, and outreach to initiate critical conversations and empower communities with knowledge and resources.

Team iGEM MIT WPU Bharat Inspires Future Biologists in Mumbai

- **Date: July 11, 2025**
- **Location: Rustomjee Cambridge International School, Mumbai**
- **Impact: Inspiring curiosity towards the life sciences in young students.**
- **Link: https://www.instagram.com/p/DM2DF0tN8F7/?hl=en&img_index=1**

Summary:
On July 11, 2025, Team iGEM MIT-WPU Bharat led an interactive session on modern life sciences with over 250 Class 8 students from Rustomjee Cambridge International School, Mumbai. They covered complex concepts, including synthetic biology, genetic engineering, recombinant DNA technology, and microbiology using worthwhile animations, some analogies, and even some quizzes to pique students' curiosity. The team also raised awareness about social issues, such as opioid abuse, and highlighted their ongoing project of an aptamer-based biosensor to detect drugs in bodily fluids. The session was well-received and gave students a sense of direction in biosciences. Through educational and interactive engagements like these, the team continues to nurture the next generation of scientists in India.

Team iGEM MIT WPU Bharat conducted a fascinating session for over 250 students from Class 8 of Rustomjee Cambridge International School, Mumbai introducing them to exciting concepts in modern life sciences. The interesting discourse was held on 11th July, 2025, team iGEM's educational initiative is to inculcate a passion for biosciences among school children and inspire them to various scientific paradigms.

In this engaging session of teaching students, key concepts of Synthetic biology, Genetic engineering, Recombinant DNA technology and microbiology were explained and simplified to stimulate the students curiosity. Tools like animations, figures and analogies like Captain America were used to make for a truly captivating and relatable session. By introducing these concepts and their diverse applications in an exciting way, team iGEM captured the students' imagination.

In addition to science education, the session also touched upon pressing societal issues. Around 2.1% of India's population- 26 million people-use opioids non-medically and synthetic opioids like fentanyl are frequently found in illegal drug supplies, increasing the risk of accidental drug overdoses.They also educated the students about the dangers of opioid abuse and the importance of saying no to peer pressure. As a part of their ongoing project, team iGEM MIT WPU is addressing this societal problem, by working on a novel sensor.

This sensor uses biological materials to detect the presence of drugs in bodily fluids. Through the use of aptamer technology, which are extremely versatile DNA and RNA sequences which can be programmed to identify a particular target molecule from a vast pool of others with high specificity.

To enhance interaction and assess understanding, this session also included various quizzes on nucleotides consisting of questions on base pairing in double stranded DNA. This activity sparked enthusiasm among the students and reinforced key concepts in a playful manner.

The feedback from the session was very positive and the students had a lot of fun learning about new ideas and terms. Everyone left with curiosity in their minds wanting to find out more about synthetic biology and genetic engineering.
Through initiatives like these, Team iGEM MIT WPU Bharat continues to nurture the next generation of scientists and changemakers, making an impact on the future of Biosciences in India.

BioQuest 2025: 1st edition

A collaborative spirit between iGEM MIT - WPU Bharat and iGEM IITB

- **Date: July 13, 2025**
- **Location: IIT Bombay, Mumbai**
- **Impact: Platform to teenagers for innovative solutions to global problems.**
- **Live sessions:**

1. **https://www.youtube.com/watch?v=KiH-1pQ2pss**
2. **https://www.youtube.com/watch?v=T507pn1VmX0**
3. **https://www.youtube.com/watch?v=stoo7-_UckM**
4. **https://www.youtube.com/watch?v=7TERuud5qXQ**
5. **https://www.youtube.com/watch?v=ZUnC8M3PumI**

- **Social media links:**

1. **https://www.instagram.com/p/DKrGrTiNCnU/?hl=en&img_index=1**
2. **https://www.instagram.com/p/DMp6LtIti4u/?hl=en**

Summary:

BioQuest'25 was the first national SynBio competition initiative produced in collaboration with iGEM MIT-WPU Bharat and iGEM IIT Bombay. It engaged Grades 9-10 students in engaging with synthetic biology through a three-tiered competition. Over 1,500 students registered to participate from around the country. Our 60 finalists were mentored by both iGEM teams, with both teams mentoring, for a combined 10 days online to tackle challenges in healthcare, agriculture, and sustainability. In addition to a robust and engaging training, students engaged in genetic engineering simulations and documentary aspects of commercialization to encourage scientific and entrepreneurial thinking. On July 13, 2025, at IIT Bombay and in front of invited professors, these teams would host the Grand Finale, where they would present and pitch their projects. The event was livestreamed to more than 2,500 people who watched in hopes of being inspired by the incredible work of these young innovators.

This year, the iGEM IIT Bombay team with iGEM MIT - WPU Bharat team spearheaded **BioQuest'25**, a first-of-its-kind national initiative dedicated to introducing high school students to the transformative field of **Synthetic Biology (SynBio)**. Designed for students in **Grades 9–10**, BioQuest'25 aimed not just to educate, but to **inspire young minds to think scientifically and solve real-world problems** using interdisciplinary approaches.
whose insights, mentorship, and active participation played a vital role in the success of the program.

Program Structure and Reach

BioQuest'25 was structured as a **rigorous, three-tier competition**, combining conceptual learning, application of SynBio principles, and innovative problem-solving. The event saw **an overwhelming response, with over 1,500 students registering from across India** — representing a wide spectrum of schools, socio-economic backgrounds, and geographic regions.

Round 1 involved an **online screening test** covering Physics, Chemistry, Biology, and General Aptitude. From this, **850 students** advanced to Round 2. The short - listed students then underwent rigorous revision sessions to make them ready for round 2.

Round 2 delved deeper into advanced biology and introduced students to the **core concepts of synthetic biology**, laying a strong academic foundation. From this stage, **60 students** were shortlisted as national finalists.

Round 3, conducted **offline at IIT Bombay**, was the heart of BioQuest'25. The 60 finalists were divided into **10 interdisciplinary teams**, each mentored by a member of the iGEM IIT Bombay team or iGEM MIT-WPU. Over the span of **two intensive weeks**, the students worked on curated **problem statements in healthcare, agriculture, and environmental sustainability**, applying SynBio frameworks to devise innovative, technically grounded solutions — many of which demonstrated potential for real-world commercialization. Along with the spontaneous team mentoring, multiple masterclass events were also conducted which involved a Genetic engineering simulation program to replicate critical processes of this complex process in reel life i.e through a web based platform that duplicated formation of a recombinant plasmid to protein expression in the fermenters. Apart from this, both the teams also conducted a Commercialisation program where students were exposed to the commercialisation aspect of synthetic biology. This indeed created a lasting impact on the students, and fostered curiosity among these young minds enabling them to think and develop innovations that stand a stronger chance beyond research and pave way till the commercialisation step, enabling them to think more like an entrepreneur.

The Grand Finale: Innovation Meets Impact

On **July 13, 2025**, the program culminated in a **Grand Finale at IIT Bombay**, where student teams pitched their ideas in a format inspired by the **iGEM Jamboree** — complete with structured presentations, visuals, Q&A rounds, and scientific validation. Their work was evaluated by an esteemed jury from IIT Bombay's Department of Biosciences and Bioengineering:

- **Prof. Swapnil Shinde**
- **Prof. Rajesh Patkar**
- **Prof. Sanjeeva Srivastava**

Each group had to present in a span of 10 minutes followed by Q and A of another 5 minutes that tested their depth of knowledge and critical understanding on three significant parts: the scientific technicalities of the project followed by its feasibility, the impact and their commercialisation strategies. The bioethics, presentation skills and the various extra curricular programs conducted by the teams were also considered and complemented by the judges.

The judges commended the students for their **depth of scientific thinking, creativity, and interdisciplinary engagement** — a testament to the power of early scientific exposure when guided by meaningful mentorship.
The event was livestreamed on YouTube, **amassing over 2500 views**, garnering an immense support and accolade from all our viewers!

Winners list and special awards

Medal	Group	Project	Mentor
Gold	Group 3	Oncology (Targeted Therapy)	Rui Agashe
Gold	Group 9	Diagnosis: Detection of non- infectious disease	Meetrayu Raut
Gold	Group 1	Coral care/ revival	Saanvi T
Silver	Group 7	Salinity shield	Ayushi Mishra
Silver	Group 2	Diagnosis: Host response markers	Sharvari Bhosale
Silver	Group 6	Sleep disruption and synthetic biology solution	Arth Agrawal
Bronze	Group 4	Sustainable Biofuels	Aarya Kunnure
Bronze	Group 5	Eco- compost	Riya Joglekar
Bronze	Group 8	Bioelectricity	Shreya Agrawal
Bronze	Group 10	Venom Shield	Angel Singhvi
Special prizes			
Best Project Overall		Group 3	
Most Innovative		Group 2	
Most Creative		Group 3 and Group 9	
Best Commercialisation		Group 7	
Audience Choice		Group 3 and Group 6	

Group 07 Resources:
YouTube playlist for genetic engineering
Master Doc (PS, Notes, Homework)

iGEM MIT-WPU Bharat at NSRTC 2025: Displaying innovation and scientific rigor

- **Date: July 18-20, 2025**
- **Location: MIT World Peace University, Pune**
- **Impact: Presenting the team project and research to the eminent scientists from all over India.**
- **Link: https://www.instagram.com/p/DNK5lMhhuy0/?hl=en&img_index=1**

Summary:

During NSRTC 2025, the iGEM MIT-WPU Bharat team attended a three-day national conference hosted by MIT World Peace University in Pune, India, and shared synthetic biology research, as well as collaborated intellectually with other universities. The iGEM team showcased two different research posters on contrasting applications of synthetic biology one displaying an aptamer-based biosensor completed to rapidly detect narcotics, and the other research on . Both research presentations aligned scientific methods, sustainability, and social impact. Researchers from multiple universities who gave feedback helped us better solidify our experimental design, in silico models, and plan for future steps of the studies. They also presented opportunities for potential collaboration in future projects! Aside from the opportunities for scientific engagement, there were expert talks, technical sessions on AI, materials, energy, and healthcare, and it was open for other students to engage with synthetic biology in unexplored environments. Overall, this engagement solidified the team's commitments to synthetic biology advancement, mentorship, and science communication for the innovation ecosystem in India.

As part of the prestigious National Science and Research & Technology Conference (NSRTC) 2025, the iGEM MIT-WPU Bharat team participated in a three-day event at MIT World Peace University, Pune. The team was able to bring the spirit of international synthetic biology collaboration to India's premiere scientific conference. During the event, the team was able to share their ongoing research, network with scientists, and take part in discussions uniting areas of biotechnology, health and sustainability.

Poster Presentations: Bridging research and feedback

The iGEM MIT-WPU Bharat team produced two posters for the conference, both reflecting on critical considerations in support of the synthetic biology projects. The posters were reiterated for scientific methodology and potential real-world impact of the projects.

Poster 1: Predicting opioid Signalling Bias through in-silico interaction profiling of human G-protein coupled receptors.

This poster presented the research that predicted opioid signaling bias using computing interaction profiling of human G-protein coupled receptors (GPCRs). The poster discussed the design, synthesis, and in-silico validation of aptamers. Both the investigations regarding computational predictions and experimental designs were both discussed. Engaging with team members provided the opportunity to ask questions, discuss positive and negative biologies,

explore considerations for future work, and obtain updates on scientific discussions and research. Overall, the engagement nurtured an interactive scientific environment.

Poster 2: In-Silico Identification and Validation of a High-Affinity and Specific Aptamer for Opioids

The poster discussed the research team's work on identifying and validating an aptamer with high specificity and affinity for opioids through in-silico approaches. The presentation emphasized both the process of computational design and the experimental validation process. The poster also discussed project sustainability and impact on society, providing a venue for attendees to interact with the researchers, share various viewpoints, and discuss possible applications and community benefit.

Feedback and Cooperative Perspectives

The presentations also offered a feedback platform, where leading scientists and colleagues gave constructive critique on experimental design, feasibility and clarity of presentations. The following were some key items learned:

- Two technical items to consider when optimizing in silico models and molecular assays.
- Insights from a translational perspective (e.g., impacts).
- Networking opportunities to establish connections for potential collaborations.
- Goals and Overall Purpose of Participation

iGEM MIT-WPU Bharat's main goal was to create a linkage between classroom research and professional scientific knowledge. The team wanted to:

- Deliver current synthetic biological research to an informed audience and multidisciplinary audience.
- Receive constructive feedback so the team could refine their experiments, improve data presentation, and enhance overall project quality.
- Encourage budding researchers and students to understand that biotechnology is an applied science to help society.
- Build scientific communication at an international standard of collaboration, inventiveness, and responsible science, which embraces the broader iGEM vision.

Impact and Takeaways

At NSRTC 2025, iGEM MIT-WPU Bharat not only highlighted its projects but also demonstrated the spirit of interdisciplinary exchange and mentorship that emerged from the conference knowledge engagement, we were able to refine our methodology, and explore future research avenues, while also refining our understanding related to science communication. More important, we were able to reflect upon the role and importance of student-led innovation towards India's scientific future. We will continue our commitment to contributing in meaningful ways to both national and global challenges.

Conclusion

Taking part at NSRTC 2025 enabled iGEM MIT-WPU Bharat to carry on its dynamic work in research, record expert mentorship, and engage with a community of innovators and thought

leaders, as part of developmental context of the ongoing situation. The conference representation solidified the team's mission; to bring synthetic biology ideas to life.

All India iGEM Meet

- **Date- July 25-27, 2025**
- **Location- Institute of Chemical technology, Mumbai**
- **Impact- Collaborating and Networking with iGEM teams all over India.**
- **Link-https://www.instagram.com/p/DNsqf-w2Gb7/?hl=en**

Summary:
Team iGEM MIT-WPU Bharat joined 14 other premier institutes for the AIIM 2025 event at ICT Mumbai from July 25–27, 2025. The event covered a broad range of workshops, guest lectures, and activities over a 3-day period to promote networking and learning in an interactive spirit. The workshop on dual-use research was particularly interesting given its focus on biosafety and biosecurity. The speakers presented to the participants expert talks on important scientific matters such as epigenetics, 3D cultures, detection of viral RNA, and energetics of bacteria. An additional computational biology workshop allowed the team to stretch their programming skills. All teams were able to showcase their projects to receive feedback from the expert panel at the end of the event, and our team talked about an aptamer-based sensor for the detection of opioids. The participants were also able to find ways to network with the poster sessions, quizzes, scientific charades, and general game time activities.

We participated in the All India iGEM meet held at ICT Mumbai from 25th-27th July, 2025. The All India iGEM meet (AIIM) is a 3 day event designed to provide Indian iGEM teams with invaluable feedback and opportunities for idea exchange during the iGEM competition. AIIM is a platform for teams to interact with one another, fostering collaboration and networking opportunities. Over 14 teams from institutions like IISC, IIT Bombay, IIT Madras and IISER Kolkata participated in this year's meet.

The 3 day event featured workshops, guest lectures and engaging activities such as games and quizzes. A very important workshop on Dual-Use Research was held by the iGEM ambassadors on day 1 of the event to make the teams aware of the importance of biosecurity, biosafety, dual use research concern and their relevance in the iGEM competition. We gained invaluable insights from this workshop and participated in the ensuing group discussion with great enthusiasm. This workshop was followed by a series of guest lectures on diverse topics. Dr. Subhojit Sen from UM-DAE CBS, Mumbai talked about synthetic models for epigenetic drug screens and how undergrad labs can be empowered to do groundbreaking research. Moving on, Dr. Prajakta Dandekar from ICT, Mumbai shared her work on 3D spheroid cultures and their significance in Anticancer Drug Development. Next, Ms. Tanvi Kale from IISER pune gave insights of her research on viral RNA detection using a translational enhancer based amplification for Toehold sensors. This was

followed by a fascinating lecture by Dr. Amitesh Anand from TIFR in adaptive bacterial energetics. Next, Ms. Varsha Jaisimha from IISC interacted with the teams and spoke about community building in iGEM. This series of talks by eminent guests on diverse topics enlightened the students from team iGEM MIT WPU on the interdisciplinary nature of sythetic biology and invoked great curiousity and inspiration. This was followed by practical experience from a computational biology workshop conducted by team IISER Behrampur.

Day 2 of AIIM was particularly impactful, wherein all teams presented their projects to an esteemed judging panel. The judges offered valuable critiques and feedback across multiple aspects of each team's project, including impact, presentation, engineering, and human practices. These sessions were crucial in guiding teams towards refining their projects. Our project is dedicated to solving the social problem of Opiod overuse by a novel sensor. This sensor uses biological materials to detect the presence of drugs in bodily fluids. Through the use of aptamer technology, which are extremely versatile DNA and RNA sequences which can be programmed to identify a particular target molecule from a vast pool of others with high specificity.

Day 3 of AIIM began with a bang by a poster presentation from all the teams. All participating students and guests were greatly intrigued by our iGEM project. The poster presentation was followed by a quiz competition from the IISC team. We conducted a highly spirited game of scientific charades where randomly drawn teams of 5 took part. 1 person was nominated as the speaker and had to describe a given biological term in just 1 word. The remaining 4 team members had to guess the word. The team who guessed the maximum number of words in 3 minutes will win. iGEM ambassador and ICT team won the game with a whopping 12 words! The scientific charades game was a hit with all the participating teams and guests. The hosts ICT Mumbai held a thrilling gene auction and team VIt conducted crisis comms. This exciting meet came to end with the prize distribution ceremony for the earlier presentations. We gained many new insights and inspiration from the AIIM. The team used this opportunity to connect with other teams to plan future collaborations. With renewed motivation, valuable feedback, and a spirit of collaboration, we returned from AIIM 2025 inspired and better equipped to take their project to the global stage.

Rural Outreach at Shri Shivaji Vidyalaya, Alandi

- **Date-August 11, 2025**
- **Location- Shel Pimplegaon, Alandi**
- **Impact- Introduction of synthetic biology to students from rural areas.**
- **Link- https://www.instagram.com/p/DN5ISXKDeuO/?hl=en&img_index=1**

Summary:

On August 11, 2025 Team iGEM MIT-WPU Bharat outreach program for a classroom of a 10th grade classroom, fine students of Shri Shivaji Vidyalaya, a government Marathi medium school in Shel Pimplegaon village, to increase accessibility to science the entire presentation was in Marathi and tailored to include genetics, recombinant DNA technology, and synthetic biology while focusing on potential agricultural applications based on their farming backgrounds. Misconceptions surrounding GMOs were dispelled, and simple experiments carried out with household items demonstrated yeast respiration. Worksheets regarding DNA, base pairing, and career pathway options within the life sciences enhanced the experience. All of these initiatives were well received and helped spark curiosity and communal engagement in science.

As part of our educational outreach team iGEM MIT WPU Bharat wanted to reach students from all demographics and increase interest in synthetic biology in areas that don't have access to many resources. As such, team MIT WPU conducted an engaging session for the class 10 students of Shri Shivaji Vidyalaya in the village of Shel Pimplegaon.

Members of our team travelled to Shel Pimplegaon village on 11th August, 2025 to interact with the students. As Shri Shivaji Vidyalaya is a government run Marathi medium school, the session was conducted entirely in Marathi- regional language of the state of Maharashtra.

In this session, we introduced the basic concepts of Genetics, Recombinant DNA technology and Synthetic Biology. As most of the students came from farming families, we emphasised the applications of genetic engineering and synthetic biology to improve agriculture and solve challenges faced by farmers. Students were also made aware of common misconceptions surrounding genetically modified organisms. In parts of rural India, misinformation and fear of novel technologies is common. By engaging with students about these techniques we aim to spread awareness and information not just amongst the students but the entire community.

As we dealt with the challenge of making the session engaging due to the absence of teaching tools like smart boards, we demonstrated anaerobic and aerobic respiration in yeast using common household items to invoke curiosity and passion for biology in students. All students were also given worksheets on DNA base pairing to further strengthen their basic concepts. Towards the end, team members guided the students in careers in the life sciences and gave valuable advice about future academic decisions.

Team MIT WPU received great feedback from the students. This outreach session at Shri Shivaji Vidyalaya not only helped us spark curiosity in young minds but also reaffirmed our belief in the importance of taking science beyond classrooms and labs to communities that need it the most.

International Overdose Awareness Day: A Student Initiative

- **Date: August 31, 2025**
- **Location: Pune and Mumbai**
- **Impact: Awareness of harmful effects of drug use in teenagers and young adults through creative expression.**
- **Link:**

1. **https://www.instagram.com/p/DOAhLMKiBq5/?hl=en&img_index=1**
2. **https://www.instagram.com/p/DOnhDneDf9Z/?hl=en&img_index=1**

Summary: iGEM MIT-WPU Bharat celebrated International Overdose Awareness Day (IOAD) on August 31, 2025, with a National-Level Essay and Poster Competition to raise awareness about drug and opioid misuse. Students from across India submitted over 35 entries that exposed the realities of overdose, prevention methods, and addressed the need for empathy when working with individuals with an addiction. Students made a commitment to value health, abstain from drugs, and support those who are impacted by addiction. The first place winners were honored in Rubisco, showcasing students' innovative ability to express meaningful change and commitment. This initiative empowered youth to be change-makers. iGEM MIT-WPU Bharat combined science, empathy, and advocacy to combat the stigmas related to opioid use and encourage the next generation to make healthier, educated decisions for a future free of overdoses.

Aim This initiative aimed to increase awareness about the dangers of drug and opioid misuse, reduce stigma around addiction, and empower students to advocate for preventive education and compassionate support. Through essays and posters, the competition engaged young minds in science-based and socially responsible discussions while honoring the lives lost to overdose.

"I pledge to value my health and make informed decisions for my well-being. I will stand against drug and opioid misuse and commit to raising awareness about its dangers. I will show compassion and support for those affected by overdose and addiction, and champion a future where science and smart choices create a healthier world for everyone."
Students made this pledge, which reflects the spirit of International Overdose Awareness Day (IOAD), celebrated every year on August 31. IOAD is the largest global campaign focusing on ending overdose, fighting stigma, and honoring those who have died from overdose. It raises awareness about prevention and calls for compassion, education, and action globally. The

Significance of IOAD Drug overdose is a medical crisis and a societal problem. Each year, thousands of families around the world lose loved ones to preventable overdose deaths. While opioids are central to this crisis, the wider misuse of prescription and illegal drugs remains a significant issue. Science provides life-saving tools like naloxone and harm-reduction strategies, but public awareness and acceptance of these measures are inconsistent. Addiction must be viewed as a health condition, not a moral failing. This change can cultivate empathy, treatment, and recovery.

National-Level Competition by iGEM MIT-WPU To mark this important day, iGEM MIT-WPU held a National-Level Essay and Poster Competition. The event attracted over 35 entries from students across India, creating a lively platform for creativity, education, and advocacy. The competition consisted of two rigorous rounds of evaluation to ensure fairness and quality in selecting the winners. Participants researched extensively, critically thought about overdose prevention, and used creative methods to share their perspectives. The initiative tested knowledge and aimed to inspire students to take on responsibilities as change-makers in their communities. By blending science with art, the competition promoted an environment where awareness could spread through innovative and relatable expressions.

Winners and Recognition The top participants received certificates of achievement, and their winning works were published in Rubisco, the scientific magazine of the Department of Biosciences and Technology at MIT-WPU. The winners of the competition were:

- Ishwar Kedar Joshi, MIT-WPU Kothrud, Pune – Poster Winner
- Vidhita Mangesh Ghadi, Abhyudaya Nagar Mumbai Public School – Poster Winner
- Rachita Alavani, MIT-WPU – Essay Winner
- Md. Kashif Khan, Bhavan's R.K. Sarda Vidya Mandir – Essay Winner

This recognition showcased their academic excellence as well as their compassion and commitment to raising awareness about a critical national and global issue. Broader Impact Through this program, students became ambassadors for awareness and change, demonstrating that youth voices are vital in driving meaningful movements. Combining scientific knowledge, creative thinking, and empathy highlighted that tackling overdose requires both evidence-based actions and compassionate community support.

Conclusion

International Overdose Awareness Day reminds us that every life matters. The initiative by iGEM MIT-WPU shows how academic institutions and students can collaborate to spread knowledge, fight stigma, and encourage healthier, science-based choices. By making pledges, participating in competitions, and sharing their voices, students proved that the fight against overdose does not rest solely with healthcare professionals; it is a shared responsibility.

Promoting Drug Abuse Awareness and Supporting Government Initiatives

Pledge

- **Date: September 10th, 2025**
- **Location: Online, https://pledge.mygov.in/fightagainstdrugabuse/**
- **Impact: Our social media campaign increased awareness, promoted responsible choices, and backed the government's anti-drug initiative.**
- **Link: https://www.instagram.com/p/DOarB9Sgfk7/?hl=en&img_index=1**

Summary

Our iGEM team took part in the MyGov India "Say Yes to Life, No to Drugs" pledge to raise awareness about drug abuse and support the government's public health efforts. We focused on social media outreach, promoting a video that used statistics to highlight drug abuse, its health effects, and ways to prevent it.

Through this, we informed young people about the science of addiction, encouraged them to think critically, and showed responsible citizenship by taking the pledge ourselves and inviting others to join.

It supports government efforts to build a more informed and responsible society.

The iGEM competition emphasizes both scientific innovation and education. Our team took part in the MyGov India "Say Yes to Life, No to Drugs" pledge to raise awareness about drug abuse. Rather than using traditional outreach methods, we focused on social media to connect with students and young adults, who are the most at risk for drug-related issues.

The aim was creating and promoting a video that presented statistics on drug abuse prevalence, health impacts, and trends among youth. The video used engaging graphics along with scientific explanations to make the information clear and impactful. By sharing this video on Instagram, we reached a wide audience, encouraging viewers to recognize the seriousness of the issue, reflect on their choices, and spread the message further.

Through our efforts, we fostered critical thinking about the science of addiction and prevention strategies. We aimed to support the government's fight against drug abuse by boosting its message and encouraging citizens, especially young people, to join the national movement against substance misuse. By using social media and visualized statistics, we turned scientific knowledge into actionable awareness while supporting the government's public health goals.

Hacking Gene Expression with Epigenetic Tools: A Collaborative Science Communication Initiative in Marathi

- **Date: September 18, 2025**
- **Location: Online**
- **Impact: The collaboration made advanced concepts in genetics, epigenetics, and synthetic biology accessible to a Marathi-speaking audience, promoting inclusive science communication. It raised awareness about gene regulation, therapeutic applications, and ethics while linking the team's iGEM work to the Sustainable Development Goals (SDGs).**
- **Link:**

1. **Youtube-https://www.youtube.com/watch?v=UeEDZrD_HAk&t=3s**
2. **Instagram- https://www.instagram.com/p/DPUHRuVEthg/?hl=en**
3. **Spotify: https://open.spotify.com/episode/0LpSVblLjx1XfXS5O01m0y**

Summary: Team iGEM MIT WPU collaborated with team iGEM VIT Vellore for creating an engaging podcast on the topic, "Hacking Gene Expression with Epigenetic tools". Two members from each team had a riveting discussion on genetics and epigenetics. The podcast also touched upon how synthetic biology can be used to to turn genes on or off. Biosafety and Bioethics aspects of research were also discussed. These complex concepts were introduced in laymen terms thus making novel biological principles accessible to the general population. In line with team iGEM MIT WPU's goal of reaching a wide audience from all demographics, the discussions took place in Marathi- the regional language of the state of Maharashtra.
Additionally, both teams also collaborated on a social media post explaining how the team projects are in line with the Sustainable Development Goals.
This collaboration with team VIT not only fostered knowledge exchange between teams but also emphasized the importance of science communication in regional languages. We were able to simplify advanced concepts and connect them to global sustainability efforts.

iGEM MIT-WPU Bharat collaborated with iGEM VIT Vellore to produce a podcast titled "Hacking Gene Expression with Epigenetic Tools", aimed at making advanced biological concepts accessible to a wide audience in Marathi, the regional language of Maharashtra. This initiative demonstrates effective collaboration by bringing together members from two iGEM teams to discuss genetics, epigenetics, and synthetic biology in an engaging and scientifically accurate way. The podcast introduced listeners to DNA as the blueprint of life, explained how epigenetic mechanisms act as switches to control gene expression without altering the DNA sequence, and highlighted how synthetic biology can leverage these switches to program cells safely and reversibly.
The discussion also emphasized science communication and education, breaking down complex concepts like reversible epigenetic changes, gene regulation, and therapeutic applications in cancer, Alzheimer's, depression, and other neurological disorders into relatable analogies, such as "DNA as hardware and epigenetics as software." By conducting the podcast

in Marathi, the collaboration achieved regional language outreach, expanding the accessibility of synthetic biology concepts to audiences often underserved by English-only resources. Ethical considerations, biosafety, and regulatory aspects were also highlighted, reflecting a commitment to responsible research communication.

In addition, the teams collaborated on a social media post explaining how their iGEM projects align with the Sustainable Development Goals (SDGs), reinforcing the connection between cutting-edge science and global sustainability challenges. This project not only facilitated knowledge exchange between teams but also exemplified innovative public engagement, making complex biological principles approachable for non-specialist audiences. Through this podcast, the collaboration successfully met key iGEM Gold Medal criteria by combining scientific excellence, educational impact, ethical awareness, and strategic outreach to inspire and inform a diverse audience.

National Level Workshop on Computational Biology: Protein–Drug Interaction using Biovia Discovery Studio

- **Date: September 24, 2025**
- **Location: Hybrid, Offline-MIT-World Peace University, India**
- **Impact: Equipping young researchers with the tools to study Computational biology.**

Summary:
On September 24, 2025, iGEM MIT-WPU Bharat hosted a National-Level Online Workshop regarding Computational Biology focusing on Protein-Drug Interaction using Biovia Discovery Studio. Participants across India, including students, research scholars, and faculty learned the principles of molecular docking, parameters setup, run simulations, analyse binding affinities and biological significance through hands-on experience. The Workshop was conducted by Meetrayu Raut and Animesh Inamdar combining theoretical and practical sessions followed by an engaging Question and Answer session addressing personalized medicine, computational limitations, and integration with wet-lab based research. Feedback was overwhelmingly positive about the workshop, and participants were keen to continue working with in-silico in their own research projects achieving the goal of iGEM MIT-WPU Bharat in using the workshop to stimulate and develop computational biology skills across the country.

On September 24th, the iGEM MIT-WPU Bharat team successfully conducted a National Level Online Workshop on Computational Biology, focused on Protein–Drug Interaction Studies using Biovia Discovery Studio. Attendees from across India, including students, research scholars, and faculty attended in what was a vibrant networking experience for learning, conversing, and collaborating in the new and exciting field of computational biology.

Purpose of the Workshop
As the iGEM organizers, we wanted to introduce young researchers to computational tools that complement wet-lab experiments in today's biology. More specifically, we wanted this workshop to:

- Emphasize the importance of studying protein–drug interactions in the context of therapeutic research.
- Have some hands-on training in Biovia Discovery Studio for real-world docking scenarios.
- Encourage students to merge in silico techniques with synthetic biology and biotechnology.
- Provide a national level platform for knowledge exchange and collaboration between a diverse group of applicants from various academia.

Proceedings of the Workshop:

The workshop was led by Meetrayu Raut and ANimesh Inamdar, who engaged participants through an informative balance of theory and practice.
The introduction started by talking about computational biology in the context of drug discovery. He explained the basic concepts of molecular docking: ligand flexibility, predicting binding site, different scoring functions for different research questions about binding sites, and conformational changes/analysis. He emphasized how molecular docking can expedite drug design, and can lead to cost savings, and provide evidence to support experimental validation.

A key highlight of the event was the way to set up docking parameters, run the docking, and analyze the results. During these sessions, participants saw, on screen, the docking poses, calculated affinity binding free energies, or related their results to biological significance in real time. This "hands on" experience helped them understand the workflow of molecular docking in a useful and realistic way.

The interactive Q&A portion was an extremely beneficial part of the workshop. The participants were asking questions about using the software, how docking was used in personalized medicine, the limitations of a computational approach, as well as how to integrate in silico experimentation with wet-lab experiments.

The feedback received from knowledge mobilization participants was extremely positive, as many participants recognized the clarity of the resource person's explanations and how he balanced theoretical and practical aspects of the material. The online aspect assured inclusivity of participants by allowing participants from all parts of the country to participate seamlessly.

One participant summed up the group reflection by stating, this workshop made this complex topic of molecular docking approachable and practical, and said “ I am motivated to integrate computational approaches in the rest of my final year research project”.

In summary, we accomplished our goals of building capacity in computational biology and inspiring young researchers to engage in drug discovery in the area of docking studies.

GPCR Signaling and Opioid Receptor Interactions in MSc Synthetic Biology Teaching

- **Date: September 24, 2025**
- **Location: MIT-World Peace University**
- **Impact: This teaching improved students' ability to engineer and use natural signaling pathways for innovative synthetic biology applications.**

Summary:

In our MSc Synthetic Biology teaching, we explored GPCR signaling and opioid receptor interactions to show how natural signaling pathways can be understood, modeled, and engineered. Students learned how receptor-ligand interactions trigger intracellular cascades that can be applied in designing synthetic circuits, biosensors, and signal-responsive systems. Interactive teaching methods, including pathway analysis, helped students connect molecular mechanisms with practical applications in synthetic biology, fostering critical thinking and design skills.

During our MSc Synthetic Biology sessions, we explored G protein-coupled receptor (GPCR) signaling and opioid receptor interactions. This helped illustrate the basic molecular mechanisms used in engineered biological systems. GPCRs are flexible membrane proteins that mediate signal transduction. They allow cells to detect and respond to environmental or chemical signals. Understanding these pathways lays the groundwork for designing programmable synthetic circuits.

By examining opioid receptor interactions, students discovered how receptor-ligand binding starts intracellular signaling cascades. These can be modeled, modified, or repurposed in synthetic biology. These pathways help create synthetic biosensors, regulatory circuits, or signal-responsive systems. This shows how natural molecular mechanisms inspire innovative design strategies.

Our teaching involved interactive methods, like pathway diagrams and understanding receptor signaling. This approach helped students connect molecular concepts with practical uses in synthetic biology, encouraging critical thinking and problem-solving skills.

By including GPCR signaling and receptor interactions in the curriculum, students gained a strong understanding of how natural signaling networks can be engineered. They are now better prepared to design innovative, functional, and responsive biological systems.

Expert Talk on Synthetic Biology – A Milestone International Collaboration Between iGEM MIT-WPU and iGEM Yale

- **Date: July 27, 2025**
- **Location: Online**
- **Impact: Synthetic biology awareness to biology undergraduate students. Students had the rare opportunity to interact with an international scientist.**
- **Link: https://www.instagram.com/p/DOyMHp-jLOR/?hl=en**

Summary:
Over 50 people with varied academic backgrounds attended an online Expert Talk on Synthetic Biology on September 28, 2025, through a collaboration of iGEM MIT-WPU and iGEM Yale. The speakers, Ayushi Mishra (MIT-WPU) and Kebron Gurara (Yale) discussed iGEM projects, issues across disciplines, and the applications of synthetic biology in the real world from both a national and international view. The interactive question-and-answer period included conversations on experiments, an ethical discussion, and the applications of synthetic biology to the world around us. The Expert Talk highlighted the benefits of international academic partnerships as participants walked away inspired and recharged with new ideas, and having acknowledged the importance of collaborating with others across borders to advance innovation and a scientific community in both of our countries.

On 28th September 2025, the iGEM MIT-WPU by Arya, Meetrayu and Ayushi and iGEM Yale teams by Regan , Miya , Yiannis successfully organized an Expert Talk on Synthetic Biology, showcasing an example of international collaboration in advancing scientific knowledge. The event was held online at 6:30 PM IST where more than 75 participants from multiple academic disciplines all seeking to learn from international experts, used this means of engaging in contact wherever they are located.

The session featured distinguished speakers: **Ayushi Mishra** from MIT-WPU and **Kebron Gurara** from Yale University. Their talks, centered on *"Synthetic Biology – Insights & Applications in iGEM"*, showcased cutting-edge research, innovative iGEM projects, and real-world applications of synthetic biology. Dr. Joglekar shared insights on how iGEM empowers students to engage in interdisciplinary problem-solving within India, while Kebron Gurara provided an international perspective, illustrating how collaborative science can tackle global challenges.

The event featured a very popular interactive Q&A session, with audience members asking questions of the speakers and panelists. The questions covered many topics, with discussions around experimental challenges and ethical questions as well as how synthetic biology solutions are practically being applied across different countries. Ultimately, the Q&A session was used not just to exchange information, but also to connect students and researchers from different countries with one another.

This event demonstrated the benefits of international academic collaboration, bringing together the expertise, ideas, and perspectives of India and the United States. Participants left with inspiration, new ideas, and a desire to contribute to the international synthetic biology community. The expert talk made the case for the importance of working across borders and between countries to promote innovation and scientific development.

Next gen therapeutics: Bioengineering at the Molecular Scale, iGEM MIT-WPU x Rubisco Collaboration

- **Date: August 28-September 2, 2025**
- **Location: Online**
- **Impact: The initiative raised awareness about the opioid crisis while inspiring students to explore bioengineering solutions, blending scientific creativity with community engagement.**
- **Link: https://www.instagram.com/p/DL2htnRSdMS/?hl=en**

Summary:
Team iGEM MIT WPU collaborated with our departmental magazine Rubisco to publish a special edition on the theme, "Next gen therapeutics: Bioengineering at the Molecular Scale." This edition featured our initiatives like Bioquest and School outreach along with detailed articles on iGEM and our project. This collaboration also played a key role in the Essay and Poster competition, showcasing winning entries and emphasizing opioid misuse impacts. Additionally, we invited 4 iGEM teams to contribute articles fostering community collaboration and highlighting the interdisciplinary nature of synthetic biology. Overall, this initiative inspired curiosity about the endless possibilities in synthetic biology and bioengineering.

We collaborated with our departmental magazine Rubisco to publish a special edition dedicated to the theme, "Next gen therapeutics: Bioengineering at the Molecular Scale." This was a special collaboration aimed to spread awareness in undergraduate and graduate students about the immense potential in the field of synthetic biology and introduce them to the iGEM competition and the various initiatives taken by team iGEM MIT WPU. This special edition was released on date.

Reports about our initiatives like Bioquest and school outreach programmes were featured in the magazine along with a detailed article on our project. This aimed to educate about the detailed science that went behind our project and the negative impacts of drug overuse amongst all the readers. Our participation in the All India iGEM Meet was also highlighted.

This collaboration also played a key role in the Essay and Poster competition organised by our team on the occasion of International Drug Overdose Day which is observed each year on August 31. All the winning entries of this competition were featured in Rubisco. This provided an exclusive publication platform to the students, ensuring that their work reached a wider audience. Overall, this competition educated and engaged students about the impact of opioid misuse and overdose, while encouraging them to think beyond traditional pharmacology and explore futuristic bioengineering approaches.

Through Rubisco, we also interacted and engaged with the iGEM community. We invited 4 iGEM teams- team VIT Vellore, team IIT Bombay, team IISER Behrampur and ICT Mumbai

to write articles on their respective projects. With this community collaboration we provided other iGEM teams a platform to wider audiences. Along with this, we also successfully demonstrated the interdisciplinary nature of synthetic biology approaches as the magazine featured a total of 5 iGEM projects.

As the magazine also featured articles from other students and researchers who are actively working in the field of synthetic biology, we successfully managed to capture the dynamic nature of bioengineering and synthetic biology that invoked curiosity amongst our many readers.

This collaboration introduced students to the possibilities of synthetic biology in public health and other domains, demonstrating how bioengineering can play a vital role in solving global challenges such as addiction. By also featuring our social initiatives in the magazine, we inspired the student to take science beyond the lab and emphasised the importance of science communication. This was a significant step towards community engagement and education, bridging the gap between scientific innovation and societal needs. The success of this initiative sets a precedent for future collaborations aimed at encouraging interdisciplinary innovation and awareness.