

INSIGHT

BIOTECHNOLOGY DAY CONTINUED INSIDE »

A review of our one-day life sciences festival

Each year, the Master of Biotechnology Program hosts Biotechnology Day, a one-day life sciences festival designed to inspire and inform curious minds. This year's event was a huge success, thanks largely to our co-sponsors, the Office of STEM Education Partnerships (OSEP) and the Biotechnology Training Program (BTP) at Northwestern University. With their help, we were able to engage, educate, and connect nearly 200 members of the scientific community!

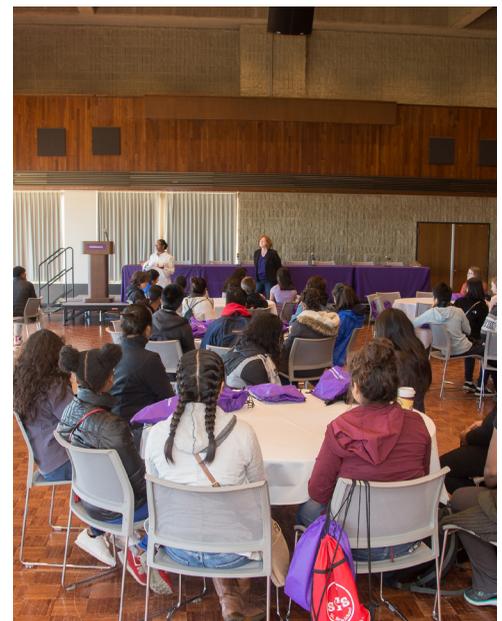
Students from Curie Metropolitan High School, Beacon Academy, and Evanston Township High School

participated in hands-on activities and small-scale scientific experiments before exploring career paths in the biotechnology field through conversations with industry professionals and Northwestern PhD students. Their visit concluded with an extensive tour of the Northwestern University campus and various laboratory facilities.

The afternoon portion of Biotechnology Day was open to curious members of the community as well as students from the Master of Biotechnology Program. Technical and non-technical career panels comprised of 14 industry professionals representing 13 different companies

delved into the details of the many diverse career possibilities offered by the biotechnology field. Francisco Rausa, Senior Principal Research Scientist at AbbVie, delivered a keynote speech which highlighted his work at AbbVie as well as exciting trends emerging in the industry. The evening concluded with an open networking session and reception in the gorgeous Ryan Center for the Musical Arts, overlooking downtown Chicago and the lake.

We would like to thank everyone for a wonderful Biotechnology Day. We hope to see you again next year—until then, stay curious!





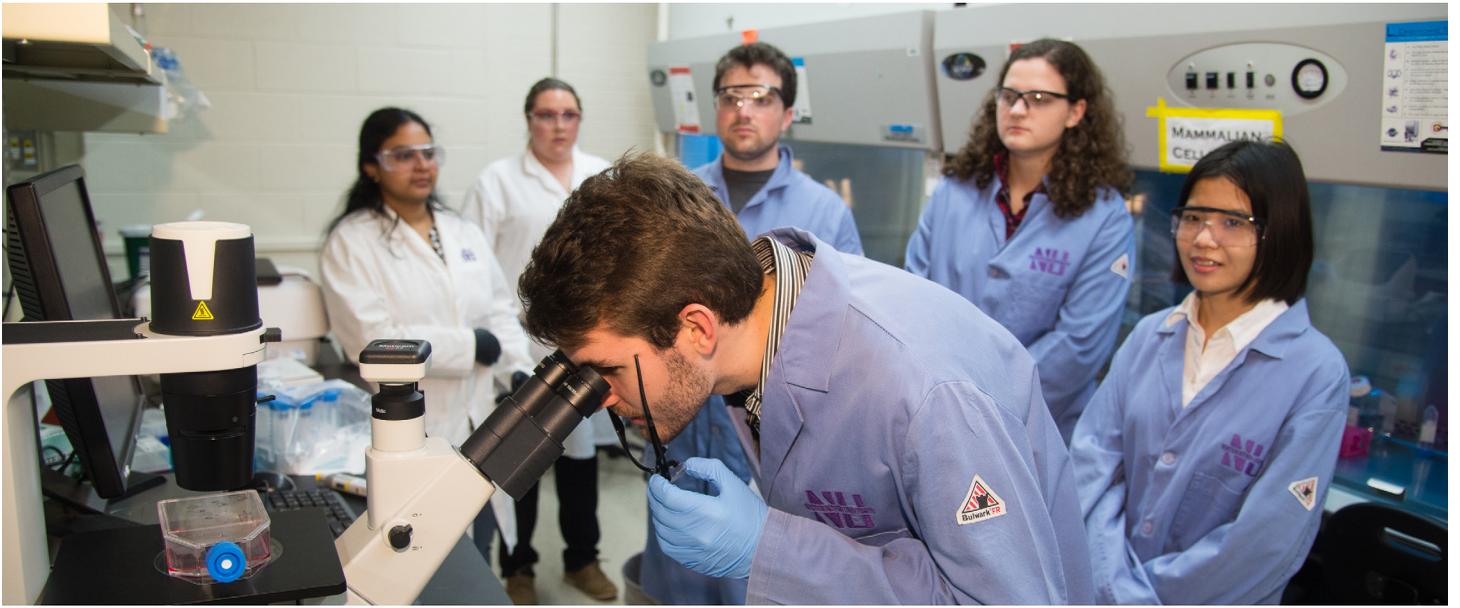
High school students take part in hands-on demonstrations during Biotechnology Day





High school students explore Northwestern lab facilities and learn about biotech career possibilities through round table discussions with PhD students and industry professionals

Prospective students visit the MBP lab during our open house



MBP students attend a career panel comprised of industry professionals in technical roles



MBP students attend a career panel comprised of industry professionals in non-technical roles



Francisco Rausa, Senior Principal Research Scientist at AbbVie (right), delivers the keynote speech

Students, panelists, faculty, and staff mingle at the open networking mixer



STUDENT RESEARCH

Announcing our students' research preceptors and projects



CHRISTOPHER CHEN

Role of Jak2 in development of leukemia in Fanconi C-deficient mice
(Dr. Elizabeth Eklund)



AMANDA KING

SOP development for NanoCytomics, Lung Tests
(Dr. Hariharan Subramanian)



TAMMY CHEN

Theranostic applications of magnetic nanoconstructs against lymphoma
(Dr. Vinayak Dravid)



RIMGAILA LUKOSIUNAITE

SOP development for NanoCytomics, Prostate and Colon Tests
(Dr. Hariharan Subramanian)



ZACH COWDEN

Optimizing a bacterial protein secretion system for on-demand protein production in extreme environments
(Dr. Danielle Tullman-Ercek)



PAUL MARKS

Synthesis, Purification and Characterization of Oligonucleotides for Spherical Nucleic Acid (SNA) Therapeutic Applications
(Dr. Subbarao Nallagatla)



DAMIEN DOSER

Optimization of microfluidic bioreactor for platelet production
(Dr. William Miller)



JON MAURO

Evaluation of mRNA Knockdown by Anti-sense Spherical Nucleic Acids
(Dr. Bart Anderson)



AARON EINHORN

Hydrogel Magnetic Nanocomposite for Tissue Engineering
(Dr. Vinayak Dravid)



MARY MILLER

Exercise-Induced Chromatin Remodeling
(Dr. Vadim Backman)



AMY FAN

Emerging Functions of SIRT2 in Nucleolus
(Dr. Athanasios Vasilopoulos)



MIKE ORMAN

Optimization of High Throughput Cardiomycocyte Differentiation
(Dr. Paul Burrige)



MEGAN HALKETT

Characterizing and phenotyping HIV/SIV susceptible immune cell populations at mucosal surfaces
(Dr. Thomas Hope)



SHOBHIT PATORIA

Identifying optimal process conditions for induction of SPI-1 type III secretion in a bioreactor
(Dr. Danielle Tullman-Ercek)



WINODE HANDAGAMA

Validation of Raman Spectroscopy for the characterization of candidate biosimilar molecules
(Dr. Edward Zartler)



SIDDHANT PRABHU

1,2-Addition reactions using MenD
(Dr. Keith Tyo)



JAKE HOFFMAN

CRISPR/Cas9 optimization
(Dr. Alex Yemelyanov)



NATALIE QUAN

Mouse strain sensitivity differences in the ovary in response to localized iatrogenic radiation
(Dr. Francesca Duncan)



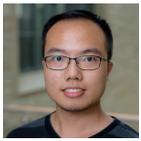
HARSHITH SUBRAMANIAN

Aromatic Substrate utilization in Acinetobacter ADP1
(Dr. Keith Tyo)



YI YI YAO

Investigating the function of kinetochore-microtubule attachment and its regulation in cancer biogenesis
(Dr. Dileep Varma)



LEMON TIAN

Identification of the binding region of KIF5B with vimentin filament
(Dr. Vladimir Gelfand)



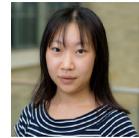
JESSICA YEH

Synthesis, characterization, and testing of liposomal Spherical Nucleic Acids (SNAs)
(Dr. Richard Kang)



ASHA VARGHESE

In Vitro modelling of Spermatogenesis by novel Cell Culture Techniques
(Dr. Christopher Payne)



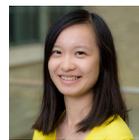
DONGQI YI

New synthesis of KT-II-115 and study of properites
(Dr. Richard Silverman)



AMBER WANG

Sequence analysis of Salmonella SPI1 type III secretion system
(Dr. Danielle Tullman-Ercek)



DIDI ZHA

Nanoparticles Targeting Isogenic Cell Lines
(Dr. Gayle Woloschak)



MARIA WANG

Combining computational and experimental approaches to engineer bacterial compartments for metabolic pathway performance
(Dr. Danielle Tullman-Ercek)



LEI ZHOU

Coupled Aerobic-anoxic Nitrous Decomposition Operation
(Dr. George Wells)



YU WANG

Understanding the role of chromosome mis-segregation and its consequences for cancer initiation and progression
(Dr. Dileep Varma)



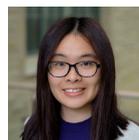
MARY ZHOU

Synthesis, characterization, and functionalization of magnetic nanoparticles for biomedical applications
(Dr. Vinayak Dravid)



DUBBY WISEMAN

Synthesis and characterization of functional protein-based materials
(Dr. Michael Jewett)



KATE ZHU

Evaluation of transcriptome analysis
(Dr. Matt Schipma)



FLORA YANG

Identification of novel HSF-1 co-factors
(Dr. Marc Mendillo)



MARINA YANG

The Roles of Cohesin Mutations in Myeloid Malignancies
(Dr. John Crispino)

NEW ABS BOARD

Introducing our new executive board for the Association of Biotechnology Students!

The Master of Biotechnology Program (MBP) also welcomed our 2017 Association of Biotechnology Students (ABS) executive board. Elected by our first year students, these students will continue an MBP tradition of organizing academic, social, community service, and professional development events and outings for all MBP students throughout the academic year. **Please meet the 2017 ABS executive board:**

JAKE HOFFMAN, PRESIDENT



Jake Hoffman is a first year student in the MBP program. He is studying biotechnology because he believes in the potential that biotechnology holds for the future. Jake's view is that biotechnology will revolutionize the way the human race interacts with their bodies, their environment, and each other; the true nature of these changes is yet to be determined, but the magnitude is sure to be great. As a result, Jake has chosen to dedicate his career to responsibly developing and implementing elegant biological solutions for the problems that plague humanity today.

Before coming to Northwestern, Jake studied Molecular and Cellular Biology at Colorado College, after which he ran away to South Korea to be an English teacher for a year and a half. When he's not studying, Jake can usually be found out on a run, reading science fiction, or playing silly board games. Jake is excited to take on the responsibilities of the ABS President, and looks forward to working with his fellow ABS members to improve the experience of his peers.

WINODE HANDAGAMA, VICE PRESIDENT



Winode Handagama graduated from Maryville College with a Bachelor of Science in Biochemistry. Throughout his undergraduate studies, he worked in a variety of fields ranging from systems biology to synthetic biology while simultaneously maintaining a leadership position in his campus' student chapter of the American Chemical Society. As a member of the 2018 Masters of Biotechnology Program cohort, Winode is committed to expanding his skills and experiences to become a better scientist capable of positively contributing to both scientific progress and society.

RIMGAILE LUKOSIUNAITI, SOCIAL COMMITTEE CHAIR



Rimgaile is passionate about applying her knowledge of science and engineering to improve healthcare access for underserved communities. She has enjoyed meeting her classmates and learning more about their passions, and hopes to help build a strong community as the ABS Social Committee Chair by understanding and enabling each student's contributions to a positive environment.

She believes she is uniquely positioned to help shape this diverse community, as she herself was born and raised in Lithuania until age 11, when she moved to the United States with her mother and sister. Her enthusiasm for having diverse experiences and meeting diverse people led her to study abroad at Linnaeus University in Växjö, Sweden while pursuing a dual BS in Biology and Exercise Science at Loyola University Chicago.

While finishing her degrees, Rimgaile began working as a personal trainer, which she continued after graduation. After a brief sales experience at Groupon, Rimgaile volunteered extensively at OIPCC, which serves uninsured patients with only two non-volunteer employees. She is excited to share her experiences with her MBP classmates and faculty and to learn from their experiences and passion for biotechnology. In her free time, Rimgaile enjoys learning new ways to organize, playing with her cat, Ginger (named not after the root or the ale, but rather the dancer), and traveling, especially to see her mother who now lives in England.

JON MAURO, CAREER DEVELOPMENT CHAIR



Jon Mauro hails from Yardley, Pennsylvania, just north of the City of Brotherly Love. When he's not being disappointed by the Eagles, Jon enjoys skiing, traveling, and playing any sport he can convince his friends to join. Jon graduated from Boston College with a degree in Biochemistry. His passion for science was reaffirmed after internships in industry at Bristol-Myers Squibb and Phosphorex. Upon graduation from Northwestern, Jon hopes to obtain a position in Research & Development at a pharmaceutical company.

NATALIE QUAN, COMMUNITY SERVICE CHAIR



Natalie Quan is currently serving as the Community Service Chair of the Association of Biotechnology Students. She is a recent graduate from Duke University with a major in Biology and minors in Spanish and Psychology. Her career goal is to practice as a pediatric specialist. In her leisure time, she loves volunteering and has previously volunteered with organizations including FEMMES, Avon Breast Cancer Crusade, and the Ronald McDonald House. She could not be more excited to spread her enthusiasm for giving back to the community and getting ABS involved!

TAMMY CHEN, TREASURER



Tammy Chen grew up in Taiwan and graduated from National Taiwan University with a major in Biochemical Science. Aside from doing research, most of her time is spent volunteering. She enjoys working with people from different backgrounds. In her spare time, she likes to watch movies and bake sweets. Hopefully you will taste some!

She is thankful that her classmates liked her simple statement and gave her the chance to collaborate with other awesome MBP students. As the ABS Treasurer for this year, she'll make the effort to handle our budget and keep track of every expenditure responsibly and effectively. Let's create an unforgettable 2017 together!



CONGRATULATIONS, ARTHUR!

Arthur Felse receives 2016 MBP Best Lecturer Award

Arthur Felse is the lecturer and Assistant Director for Research in the Master of Biotechnology Program. Arthur teaches or coordinates several MBP courses, and he also teaches in the Chemical and Biological Engineering department at Northwestern University. He manages research training for MBP students and directs the MBP teaching laboratory.

Arthur strives to make his classrooms “intellectual safe zones” where every student feels invited to share and exchange ideas without the risk of judgement or evaluation. His teaching centers on the philosophy that every student has great potential that needs to be nurtured and developed by teachers. He is a strong believer of learning-by-doing and his pedagogical approaches include students in the instructional process. All his courses have hands-on exercises and student-led activities.

Arthur values students who go above the bar, demonstrate a willingness to try something new, and have the curiosity to look beyond the obvious. Students in Arthur’s lab course learn to ask the right questions and to define problems before setting out to solve them. An advocate for communication across disciplines, Arthur teaches his students to bridge gaps and offer clarity in their explanations. Arthur received the 2016 MBP Best Lecturer Award from students in recognition for excellence in teaching and advising.

Formally trained in Chemical Engineering (BS), Biotechnology (MS and PhD), and Biocatalysis (post-doc), Arthur’s current research interest is in the emerging area of regulatory science. He is also actively engaged in engineering education research, trying to understand how non-engineers learn engineering and studying diversity in engineering disciplines.

He is actively involved in the American Society for Engineering Education, where he served as the Chemical Engineering Division Program Chair for the 2016 Annual Conference. He also served as a faculty member in the 2012 Chemical Engineering Summer School, which is a week-long training program for chemical engineering educators. Arthur’s engagement with professional organizations has broadened his sphere of influence in the field and has provided opportunities to learn new pedagogical methods that he uses in classrooms.

Arthur serves as a manuscript reviewer for several journals — *Biochemical Engineering Journal*, *Colloids and Surfaces*, and *PLOSone* to name a few — and has been an evaluator for four PhD theses. He is currently the co-editor of the diversity special issue in the journal *Chemical Engineering Education*. He has also served as invited faculty at summer schools and workshops in the general area of biochemical engineering.

During post-doc research at New York University, Arthur and his colleagues were awarded the EPA’s Presidential Green Chemistry Challenge Award for their work on mild and selective polymerizations using lipases. He was also the recipient of the Governor’s Gold Medal for overall excellence in Master’s study.

“Every student has great potential that needs to be nurtured and developed by teachers.”



Critical Thinking and Communication

MB 420 | Winter 2017



Instruction & Schedule

Students' path in this course will be facilitated by the instruction on argumentation, writing, and oral presentations. The eight-week-long sequence of lectures will include the topics shown on the right and focus on easily-deployable practical tools, such as ABT (And-but-therefore) narrative.

Significantly, students will actively evaluate their classmates presentations and create a map connecting their research project with a few of the research projects of their classmates.



Week 1: ABT narrative
 Week 2: Advanced ABT narrative
 Week 3: Argument maps
 Week 4: Critical vs. creative thinking
 Week 5: Theory of argumentation
 Week 6: Infographics
 Week 7-8: Presentation exercises
 Week 9-10: Student presentations

This course aims at giving students a range of opportunities to exercise their critical thinking muscle and create written, visual, and oral embodiments of their individual research projects, which will be useful in their future job-hunting endeavors.



Presentations

Student presentations will be the pinnacle of this course. Students will start by writing a justification argument that captures the significance of their research projects, then convert it into infographics and present it to their classmates.

The presentations will give students a chance to practice their public speaking skills, share their knowledge, and "connect the dots" by reflecting on the similarities and differences of their research projects.

Rationale

Source
 Remember to give credit to your resources — insert links to the original articles. Take this example:
www.piktochart.com/blog

Deliverables



A 200-word justification of the research project



Infographics and a presentation



A map connecting the student research to classmates' research

NEW COURSES

MBP introduces new classes

A few years ago, we introduced a Critical Thinking and Communication course (MBiotech 420, formerly MBiotech 505), which has evolved to focus on the theory of argumentation, data analysis, and basic scientific writing. This course originally lacked an integrated oral communication element, which is important when making a first impression, presenting an elevator pitch, or interviewing. Therefore this year, we hired Marina Damiano, a graduate of Northwestern University and a scientific communication and theatre consultant to co-teach this course with Igor Kourkine.

A visual syllabus of the new MBiotech 420 is shown above.

The MBP also introduced a zero-unit course on Responsible Conduct of Research (MBIOTECH 508) this year. All MBP students will be required to complete it. This course will develop ethical and moral reasoning through case analysis on the topics of plagiarism, academic honesty, conflict of interest, mentoring and lab management, collaborative research, data ownership and management, peer review, authorship, scientific misconduct and the processes for handling misconduct. The class will be taught through a combination

of conversations with invited faculty, discussion of case studies, and role play activities. The course will be spaced over three quarters with two meeting sessions each quarter.

Through this class, students will become familiar with institutional and professional regulations relevant to research, recognize the ethical dimensions of research activities and be able to apply moral reasoning skills, and feel empowered to hold themselves and others to high ethical standards.

The Regulatory Sciences in Biotechnology course was recently approved as a permanent cross-listed

course between MBP and the Department of Chemical & Biological Engineering (MBIOTECH 482/CHEM_ENG 382). This course will provide a unique educational experience at the intersection of science, engineering, and biotech regulatory compliance.

Topics such as federal regulations for drug product development, regulatory compliance processes and organizational structure, interface

between biotechnology processes and regulatory sciences, global harmonization of regulations, and regulatory documentation will be covered in this course.

This course will be taught by several guest lecturers from the industry by way of lectures, case-study discussions, and team projects. The intent of this course is to educate students to obtain a working knowledge of biotech regulatory

compliance to an extent where they can effectively liaison with regulatory compliance personnel. Students will be exposed to career opportunities in regulatory science/compliance, and they will have the opportunity to engage with several industry guest speakers.

INDUSTRIAL ADVISORY BOARD

Upcoming meeting in June

On June 7-8, 2017, the MBP Industrial Advisory Board (IAB) will convene at Northwestern University to meet with MBP students and faculty, evaluate the effectiveness and relevance of our program, and provide suggestions for program improvements.

Wednesday, June 7 will be devoted to IAB member-student interactions, including poster presentations and a young alumni career panel in the Norris Center, followed by a networking reception and grazing dinner in the Scott Hall Guild Lounge. MBP students will apply approaches developed during this winter's Critical Thinking and Communication class to create and present informative posters on their research projects during the afternoon, and will employ skills from the Professional Development course to engage with IAB members in the evening. These events will provide MBP students with a unique opportunity to learn about new developments in the biotechnology industry and develop connections

with industry leaders and recent MBP graduates.

On June 8, the IAB members and MBP faculty will come together in a collaborative space to “compare notes” on MBP program and student achievements from the last year and set goals for the future. Recommendations from past IAB meetings led to the development of the biotechnology laboratory class, Technology Commercialization Fundamentals, and dedicated courses on team building and professional development.



CO-OPS VS INTERNSHIPS

What are the differences?

It's that time of the year when students should be focusing on obtaining internships and co-ops that begin in the summer of 2016. Most companies have already been recruiting since September 2016. The MBP encourages students to gain industry experience through research and by participating in internships and co-ops.

Co-operative (co-op) education is a 6-month paid career training program that allows students to work with industry professionals. Only students can apply for co-op opportunities and once you have completed the co-op you must return to your program of study. Co-op positions are offered on a part-time basis (20 hours or less weekly) or a full-time basis (40 hours weekly).

Advantages to the co-op experience include:

1. Opportunities to network with professionals
2. Gain valuable experience that will prove useful after graduation
3. Explore career opportunities while working within the organization
4. Co-op training will be added to your official transcript

An internship is a 10-12 week paid program that is normally offered during the summer months. Internships can be full time or part time, but the Assistant Director of Career Management & External Relations recommends pursuing a full time internship during the summer months.

Advantages of internships include:

1. Learn about your field of study
2. Gain valuable work experience
3. References for future job opportunities
4. Build your network

Once a student accepts an internship, please follow up with Natalie Champagne, Assistant Director of Career Management & External Relations. Before you begin your internship/co-op, please follow up with Tameca Lyons, Associate Director of Engineering Career Development.

The Master of Biotechnology Program and the Association of Biotechnology Students (ABS) are hosting an **Internship Panel on Friday, February 10, 2017** from 6:30 pm - 8:00 pm in Cohen Commons.



VIRTUAL OPEN HOUSE

MBP to host virtual info session on February 10

On February 10, 2017, at 11 am - 12 pm (CST), the Master of Biotechnology Program (MBP) will hold our first online information session, enabled by the Blue Jeans technology platform. Participants will have access to a video stream featuring a brief presentation by the MBP Associate Director and then engage in Q&A session with MBP faculty and students.

This online information session is a great opportunity to learn about the MBP - its competitive advantages, best practices, and culture.

Participants will have an opportunity to submit questions before and during the information session; these questions will determine the exact scope of the information session, but potential topics include MBP curriculum, research, internships, professional development opportunities, and enrichment of soft skills.

If you know a colleague or friend who might be interested in the MBP, please bring this information to their attention.





MBP MIXER

TUESDAY, MARCH 21 - SAN DIEGO
THURSDAY, MARCH 23 - SAN FRANCISCO

**JOIN US FOR AN EVENING OF
FOOD, DRINKS, AND FUN**

More details to be announced soon!



SPRING SITE VISIT

MBP headed to Bay Area Biotech Cluster

The Master of Biotechnology Program frequently organizes site visits designed to provide firsthand insight into the biotechnology industry. On site visits, students explore different aspects of various prominent companies by touring innovative laboratory facilities and interacting with industry professionals.

This spring, the MBP will be traveling to the Bay Area Biotech Cluster, one of the largest biotechnology hubs in the country. Located near San Francisco, CA, this cluster is home to an impressive network of academic institutions, entrepre-

neurships, and diverse pharmaceutical and biotech companies. Over 1,400 life sciences companies comprised of over 52,000 people contribute to the Bay Area's success, generating revenue exceeding 29 billion dollars per year.

On March 23rd, MBP students will visit Gilead Sciences, Inc. and Allure Labs. Gilead Sciences, Inc. is one of the world's largest biopharmaceutical companies, whose research focuses on discovering, developing, and commercializing new life-saving medicines. Allure Labs is a cosmetic research and development company which formulates an

extensive selection of beauty products for more than 700 clients worldwide.

On March 24th, MBP students will visit Genentech and TerraVia. Genentech has been a leader in the biotech industry for over 40 years. The company's primary focus is on discovering, developing, manufacturing, and commercializing drugs to treat patients with serious or life-threatening medical conditions. TerraVia is a plant-based company that focuses on food, nutrition, and specialty ingredients, seeking to improve the nutritional content of food without sacrificing taste.

STAY TUNED FOR FURTHER DETAILS ABOUT OUR SPRING SITE VISIT!