Welcome to the

Biochemistry Major

in the College of Physical and Mathematical Sciences

College Advisement Center

Website: https://science.byu.edu/advisement Email: science.math.advisement@byu.edu

Phone: 801-422-2674 Office: N-181 ESC

Chemistry and Biochemistry Department

Website: chem.byu.edu Phone: 801-422-3667 Office: C-100 BNSN

Department Advisement – Sue Mortensen*

Email: suemort@chem.byu.edu

Phone: 801-422-6269 Office: C-104 BNSN

Internship Coordinator – Richard Watt

Email: rwatt@chem.byu.edu

Phone: 801-422-1923 Office: C-210 BNSN

University Career Services – Anna Kennington

Website: careers.byu.edu (Handshake--see flyer in packet)

Email: anna.kennington@byu.edu

Phone: 801-422-5944, or 801-422-2674 (schedule appointment)

Office: C-106 BNSN

STEM Alliance--Connect with STEM employers, mentors, and clubs: stemalliance.byu.edu

Clubs

YChem: Walter Paxton, E111 BNSN, paxton@chem.byu.edu; 422-4917

Women in Chemistry: Kara Stowers, C309 BNSN, kstowers@chem.byu.edu, 801-422-0835

Cougs v Cancer: Cristy Welsh, E-181 BNSN, sccr@chem.byu.edu. 801-422-3913

*Please visit Sue Mortensen in the Chemistry and Biochemistry Department as soon as possible if you have not already done so.

Learning outcomes can be found here: https://learningoutcomes.byu.edu/Courses/program-courses/692826/Biochemistry+BS+/1322



Things to Know

Resources for Graduation Planning

- Flow Charts and Major Academic Plans (MAPs) can be found here:
 https://science.byu.edu/advisement/flowcharts.
- Academic advisors in N-181 ESC will help you understand course sequencing and help you plan classes to
 efficiently fill requirements. They can also help you with study skills and initial career exploration as well as
 connecting you with correct resources.
- Plan and register from your plan on MyMAP. Your academic advisor can help you understand how to best utilize this resource.
- Evaluate your current program. Periodically major programs are updated. An academic advisor would be happy to review the differences between the programs with you to help you determine what would be best for you.
- o Consider meeting with a faculty advisor in your department. Contact info is found on first page of this packet.

Tutoring Resources and Research

- Volunteer peer tutors are available through Y Serve if you need help with a class. Also, if you excel in a subject,
 consider serving your fellow students by becoming a tutor. Find out more here: https://tutoring.byu.edu/.
- Many departments provide TA Tutorial Labs and research opportunities. Check your department for details:
 - Chemistry and Biochemistry: C-100 BNSN, 801-422-3667, https://www.chem.byu.edu/
 - Computer Science: 3361 TMCB, 801-422-3027, csoffice@cs.byu.edu
 - Geological Sciences: S-389 ESC, 801-422-3918, geology@byu.edu
 - Mathematics: 275 TMCB, 801-422-2061, office@mathematics.byu.edu
 - Mathematics Education: 167 TMCB, 801-422-1735, office@mathed.byu.edu
 - Physics and Astronomy: N-283 ESC, 801-422-4361, physics_office@byu.edu
 - Statistics: 2152 WVB, 801-422-4505, statsec@stat.byu.edu

Prepare Early for a Career

- o Check out University Career Services in 2590 WSC and at https://ucs.byu.edu/.
- Consider doing an internship.
 - Attend the STEM and Career Fairs held in fall and winter semesters.
 - Talk to your department about internship opportunities.
 - Use LinkedIn and Handshake (see flyer in this packet) to connect with alumni and apply for jobs/internships. BYU Connect is another great resource for networking (connect.byu.edu).
 - Talk with the college Career Director who can help you search for internships as well as assist you with many other career related strategies (see first page of this packet).
- o Consider taking StDev 317 (Career Strategies) your junior year.
- O Consider taking either Chem 502, CS 502, Geol 502, Math 502, PHSCS 502, or STAT 502 (1-credit Job Search Class). Class is held for 1 hour per week for eight non-consecutive weeks throughout the semester.

BS in Biochemistry (692826) MAP Sheet

Physical and Mathematical Sciences, Chemistry and Biochemistry For students entering the degree program during the 2022-2023 curricular year.



University Core and Graduation Requirements				Suggested Sequence of Courses			
University Core Requirements:				FRESHMAN YEAR		JUNIOR YEAR	
Requirements	#Classes	Hours	Classes	1st Semester		5th Semester	
Religion Cornerstones				CHEM 111* (F)	4.0	CHEM 391 (FW)	3.0
•				MATH 112 (WSpSu)	4.0	CHEM 482 (F)	3.0
Teachings and Doctrine of The Book of	1	2.0	REL A 275	First-year Writing or A HTG 100 (FW) Biological Science - BIO 130 or CELL 120**	3.0 3.0-4.0	CHEM 584 (F) PHSCS 220 (FWSu)	3.0 3.0
Mormon				Religion Cornerstone course	2.0	CHEM 497R (FWSPSu) or open elective	1.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	Total Hours	16.0-17.0	Civilization 1 or Social Science	3.0
Foundations of the Restoration	1	2.0	REL C 225	*With department approval, CHEM 105 may be sub		Total Hours	16.0
The Eternal Family	1	2.0	REL C 200	111. **There is no major-specific biology course red		6th Semester	
The Individual and Society				G.E. Biological Requirement. CELL 120 or BIO 130 a	•	CHEM 586 (W)	3.0
American Heritage	1-2	3-6.0	from approved list	options.		CHEM 468 (W)	3.0
Global and Cultural Awareness	1	3.0	from approved list			PWS 340 (FW)	3.0
Skills	1	5.0	nom approved list	2nd Semester	2.0	CHEM 497R (FWSpSu) or Requirement 5	1.0
				First-year Writing or A HTG 100 (FW) CHEM 112* (W)	3.0 3.0	CELL 360 (FWSp) or other Requirement 4	3.0 2.0
First Year Writing	1	3.0	from approved list	CHEM 113* (FW)	2.0	Religion Elective Total Hours	2.0 15.0
Advanced Written and Oral Communications	1	3.0	CHEM 391*	CHEM 201 (FW)	0.5		15.0
Quantitative Reasoning	1	4.0	MATH 112* or 113*	MATH 113 (FWSpSu)	4.0	SENIOR YEAR 7th Semester	
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*	Religion Cornerstone course	2.0	CHEM 489 (F)	3.0
Arts, Letters, and Sciences				Total Hours	14.5	CHEM 594R (FW)	0.5
Civilization 1	1	3.0	from approved list	* With department approval, CHEM 106 may be sub	ostituted for CHEM	CHEM 497R, 498R (FWSpSu) or Requirement 5	3.0
Civilization 2	1		from approved list	112; CHEM 107 for CHEM 113.		Civilization1, 2 or Social Science	3.0
Arts	1		from approved list	SOPHOMORE YEAR		Global and Cultural Awareness	3.0
				3rd Semester		Religion Elective Total Hours	2.0 14.5
Letters	1		from approved list	CHEM 227 (FSp)	4.0		14.5
Biological Science		,	BIO 130* or CELL 120*	STAT 201 (FW) or MATH 213 & 215 (FW)	3.0	8th Semester CHEM 495 (FW)	1.0
Physical Science	2	7.0	CHEM 111* and PHSCS	PHSCS 121 (FWSpSu)	3.0	CHEM 498R (FWSpSu) or other Requirement 5	3.0
			121*	CHEM 351M* (F)	3.0	Civilization 2 or Social Science	3.0
Social Science	1	3.0	from approved list	Religion Cornerstone course Total Hours	2.0	Arts	3.0
Core Enrichment: Electives					15.0	Letters	3.0
Religion Electives	3-4	6.0	from approved list	*CHEM 351 may be substituted for CHEM 351M		Religion elective	2.0
Open Electives	Variable	Variable	personal choice	4th Semester		Total Hours	15.0
•				CHEM 352M* (W)	3.0		
THESE CLASSES FILL BOTH UNIVERSITY CORE A	ND PROGRA	M REQUIF	REMENTS (21-22 hours	CHEM 354 (FWSp)	1.0		
overlap)				CHEM 381M** (W)	3.0		
				CHEM 384 (W)	1.0		
Graduation Requirements:				PHSCS 123 (FWSp)	3.0		
•				CHEM 497R (FWSpSu) or open electives Religion Cornerstone course	1.0 2.0		
Minimum residence hours required		30.0		Total Hours	14.0		
Minimum hours needed to graduate 120.0			*CHEM 352 may be substituted for CHEM 352M; CHEM 353 may be substituted for CHEM 354 **With department approval, CHEM 481 may substitute for CHEM 381M. Pre-professional students may need 2 credits of CHEM 353, depending on specific professional school entrance requirements.				
					cnool entrance		

BS in Biochemistry (692826)

2022-2023 Program Requirements (77 Credit Hours)

MMBIO 468 - (MMBio-Bio-PWS) Genomics

REQUIREMENT 1 Complete 18 courses	
NOTE: WITH DEPARTMENT APPROVAL CHEM 105 MAY SUBSTITUTE F	OR
CHEM 111; AND CHEM 106 FOR CHEM 112; AND CHEM 107 FOR CHEM	113.
NOTE: ONLY 1 CREDIT HOUR OF CHEM 354 IS REQUIRED; COMPLETION	ON OF 2
CREDIT HOURS WILL SATISFY THE REQUIREMENT FOR CHEM 354 AN	D 1
CREDIT HOUR OF ELECTIVES UNDER REQUIREMENT 4.	
CHEM 111 - Principles of Chemistry 1	4.0
CHEM 112 - Principles of Chemistry 2	3.0
CHEM 113 - Introductory General Chemistry Laboratory	2.0
CHEM 201 - Chemical Handling and Safe Laboratory Practices	0.5
CHEM 227 - Principles of Chemical Analysis	4.0
CHEM 351M - Organic Chemistry 1 - Majors	3.0
CHEM 352M - Organic Chemistry 2 - Majors	3.0
CHEM 354 - Organic Chemistry LaboratoryMajors	2.0v
CHEM 381M - Fundamentals of Biochemistry	3.0
CHEM 384 - Biochemistry Methods	1.0
*CHEM 391 - Technical Writing Using Chemical Literature	3.0
CHEM 468 - Biophysical Chemistry	3.0
CHEM 482 - Mechanisms of Molecular Biology	3.0
CHEM 489 - Structural Biochemistry	3.0
CHEM 495 - Senior Seminar	1.0
CHEM 584 - Advanced Biochemistry Methods 1	3.0
CHEM 586 - Advanced Biochemistry Methods 2	3.0
CHEM 594R - General Seminar	0.5
REQUIREMENT 2 Complete 6 courses	
MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
PHSCS 121 - Introduction to Newtonian Mechanics	3.0
PHSCS 123 - Introduction to Waves, Optics, and Thermodynamics	3.0
PHSCS 220 - Introduction to Electricity and Magnetism	3.0
PWS 340 - Genetics	3.0
REQUIREMENT 3 Complete 1 option	
OPTION 3.1 Complete 1 course	
STAT 201 - Statistics for Engineers and Scientists	3.0
OPTION 3.2 Complete 2 courses	
MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0
REQUIREMENT 4 Complete 1 course	
CELL 360 - Cell Biology	3.0
CELL 362 - Advanced Physiology	3.0
MMBIO 463 - Immunology	3.0
MMBIO 465 - Virology	3.0

REQUIREMENT 5 Complete 7.0 hours from the following course(s) AFTER CONSULTING WITH AN ADVISOR, COMPLETE 7 HOURS FROM 1: FOLLOWING. NOTE: ONLY ONE OF BIO 130 OR CELL 120 CAN BE APPL THIS REQUIREMENT. NOTE: CHEM 355 CANNOT BE TAKEN IF CHEM 3 TAKEN FOR 2 CREDIT HOURS. NOTE: WITH PRIOR APPROVAL, MANY. LEVEL AND ABOVE COURSES IN BIOLOGY, INTEGRATIVE BIOLOGY, MICROBIOLOGY AND MOLECULAR BIOLOGY, AND PHYSIOLOGY AND	IED TO 54 WAS
DEVELOPMENTAL BIOLOGY WILL FILL THIS REQUIREMENT.	
BIO 130 - Biology	4.0
CELL 120 - Science of Biology	3.0
CHEM 355 - Organic Chemistry Laboratory 2 - Nonmajors	1.0
CHEM 397R - Mentored Outreach and Service Learning	3.0v
CHEM 455 - Synthesis and Qualitative Organic Analysis	4.0
CHEM 460 - Mathematics for Physical Chemistry	1.0
CHEM 496R - Academic Internship: Chemistry and Biochemistry You may take up to 3 credit hours.	6.0v
CHEM 498R - Capstone Experience in Chemistry/Biochemistry	4.0v
You may take up to 3 credit hours.	1.00
CHEM 514 - Inorganic Chemistry	3.0
CHEM 518 - Advanced Inorganic Laboratory	2.0
CHEM 521 - Instrumental Analysis Lecture	2.0
CHEM 523 - Instrumental Analysis Laboratory	2.0
CHEM 552 - Advanced Organic Chemistry	3.0
CHEM 553 - Advanced Organic Chemistry	3.0
CHEM 563 - Reaction Kinetics	3.0
CHEM 565 - Introduction to Quantum Chemistry	3.0
CHEM 567 - Statistical Mechanics	3.0
CHEM 569 - Fundamentals of Spectroscopy	3.0
CHEM 581 - Advanced Biochemical Methodology 1	
CHEM 583 - Advanced Biochemical Methodology 2	3.0
CHEM 596R - Special Topics in Chemistry	3.0
You may take up to 3 credit hours.	3.0v
HONRS 499R - Honors Thesis	
V 2 11 12 2 12 1	6.0v
You may take up to 3 credit hours.	
Recommended Courses: Chem 460.	

Note: Supporting courses suggested by most medical and dental schools are found by visiting the Preprofessional Advisement Office. The more rigorous chemistry, mathematics, and physics courses required for the chemistry majors will satisfy the minimum requirements listed there. Elective courses in biochemistry and in biological science are especially pertinent to these preprofessional programs.

REGISTRATION ADVISEMENT

We want to assist students in their academic pursuit toward an undergraduate degree. Students are encouraged to complete an average of 15 credit hours each semester or 30 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the number of semesters to graduate.

New students should attend the chemistry and biochemistry session during New Student Orientation, where they can meet with a faculty advisor and review their planned registration. Transfer or mid-year incoming students should meet with an advisor prior to the add/drop deadline of their first semester, usually after the first week of class.

The department recommends a review of progress and planned registration with a faculty advisor in the semester when 30, 60, and 90 hours are completed. However, academic advisement is available to all majors at *any* point in their academic career. Contact the department advisement office to schedule an appointment with a faculty advisor: in person C104 BNSN; by phone 801-422-6269; by email suemort@chem.byu.edu or coffice@chem. byu.edu

MENTORED RESEARCH/EXPERIENTIAL LEARNING

We strongly encourage our majors to participate in mentored learning and receive credit toward completing their major requirements. Approximately 80% of our faculty conduct independent, externally funded research and invite undergraduates to participate in on-campus mentored learning opportunities. Students initiate contact with a faculty whose research interests them. Upon acceptance to participate in a research lab, students enroll in a series of mentored research courses (CHEM 297R, 497R) throughout their academic career, culminating in a capstone research experience (CHEM 498R). Contact the department advisement center for additional information: 801-422-6269; C104 BNSN; suemort@chem.byu.edu or coffice@chem.byu.edu.

THE DISCIPLINE

The Biochemistry Bachelor of Science degree provides excellent

BS in Biochemistry (692826) 2022-2023

preparation for students preparing for health-related fields (medicine, dentistry, veterinary medicine) or for those who desire an advanced degree (MS or PhD) in biochemistry, molecular biology, or the health sciences. Chemists and biochemists study the fundamental processes that govern the natural world, including atomic structure and how atoms interact to form molecules and materials. They study the mechanisms of chemical processes, including those that underpin living systems such as the transfer of information from DNA to RNA to proteins. They work to develop simplifying

models (theories) that permit the correlation and explanation

of observations about the behavior of life to the structure of

rocks and minerals.

Chemistry and biochemistry provide an essential foundation for the medical sciences, engineering (especially chemical engineering), electronics, energy, environmental sciences, materials science, pharmacy, and virtually all manufacturing processes.

Chemistry and biochemistry are active branches of science that are vital to human existence. Inasmuch as the field embraces all aspects of the material world, it is subdivided into five areas of interest. Examples of these diverse areas include the regulation of protein synthesis, cellular signal transduction at the molecular level and proteomics (biochemistry), design and synthesis of medicinal compounds, catalysts and polymers (organic chemistry), design and synthesis of new molecular structures and materials (inorganic chemistry), spectroscopic study of energy transfer and molecular structures (physical chemistry), and analysis of medicinal compounds, biological materials, and contaminants or trace elements found in the environment (analytical chemistry).

Chemistry and biochemistry involve far more than test tubes and beakers. They include sophisticated methodologies such as recombinant DNA technology, working with a variety of instruments such as mass spectrometers, calorimeters, chromatographs, ultracentrifuges, lasers, X-ray diffractometers, electron microscopes and nuclear magnetic resonance spectrometers, all of which are used by undergraduate

chemistry and biochemistry students at BYU. Computers also play an important role in these disciplines, with applications ranging from simulation of molecules and their interactions to the collection and analysis of data. The chemistry and biochemistry curricula are both rigorous and intellectually rewarding.

CAREER OPPORTUNITIES

Graduates in chemistry and biochemistry obtain positions in education and many different industries, performing analysis, synthesis, characterization, observation, and modeling. Those who work hard, are creative, and have intellectual curiosity are in particular demand. The discipline also provides an excellent preprofessional course of study for those interested in medicine, dentistry, law, and business.

MAP DISCLAIMER

While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

DEPARTMENT INFORMATION

Department of Chemistry and Biochemistry Advisement

Brigham Young University C-104 BNSN Provo, UT 84602 Telephone: (801) 422-6269

ADVISEMENT CENTER INFORMATION

Physical and Mathematical Sciences College Advisement Center

Brigham Young University N-181 ESC Provo, UT 84602

Telephone: (801) 422-2674

!				
/				

BYU Biochemistry BS

Requirements / Prerequisites 2022-2023 Academic Year

Major (77 Hours) Complete the following: Chem 111, Chem 112, Chem 113,

596R, Honrs 499R.

After consulting with

an advisor, complete 7

hours from the

following to fulfill

requirement #5.

Biol 130

Pre-Reg: None

FW

CELL 120

Pre-Req: None

FWSp

Chem 397R

Pre-reg: Chem 111,

Chem 112, & Chem 113

- Chem 201, Chem 227, Chem 351M, Chem 352M, Chem 354, Chem 381M. Chem 384. Chem 391. Chem 468. Chem 482. Chem 489, Chem 495, Chem 584, Chem 586, Chem 594R
- Complete the following: Math 112, Math 113, Phscs 121, Phscs 123. Phscs 220. PWS 340. Complete either Stat 201 or Math 213 and 215.
- Complete one course from the following: CELL 360, CELL 362, MMBIO 463, MMBIO 465, MMBIO 468.
- After consulting with an advisor, complete 7 hours from the following: Biol 130, Cell 120, Chem 355, Chem 397R, Chem 455. Chem 460. Chem 496R. Chem 498R. Chem 514. Chem 518, Chem 521, Chem 523, Chem 552, Chem 553, Chem 563, Chem 565, Chem 567, Chem 569, Chem 581, Chem 583, Chem
- Note: Only one of Bio 130 or Cell 120 may be used towards requirement 5. If Chem 354 was taken for 2 credits. Chem 355 cannot be taken to fill requirement 4. For Biochemistry majors Chem 354 should be taken for one credit.

Chem 355

Pre-Req: Chem 354

Or Chem 353

FWSS

Chem 455

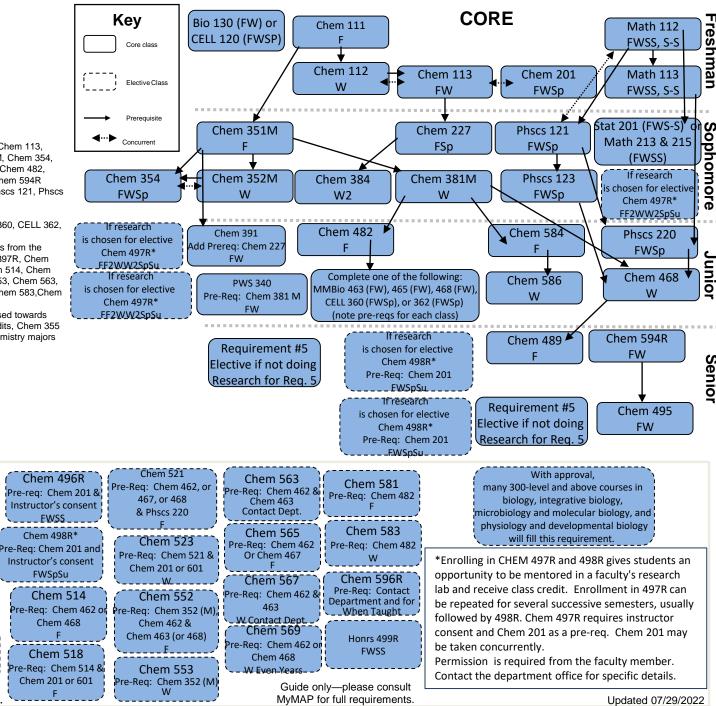
Pre-Req: Chem 354

Or Chem 353; Chem 201

Chem 460

Pre-Req: Concurrent

with Chem 462



res

man

omore

Junio

When taught: Contact Dept Note: When Taught is subject to change.

ii handshake

BYU's own job board. Employers who want to hire BYU graduates or offer internships to current students post job openings to this website and students apply. Just like LinkedIn, employers can view student profiles and students can network as they apply for jobs and internships

Login to handshake.byu.edu >>> BYU Net ID

*you do not need to create an account, just sign in with you BYU information



HOW TO MAKE THE MOST OUT OF HANDSHAKE:

1. COMPLETE YOUR PROFILE

- Upload your resume and it will auto-fill in your profile
- Completed profiles tailor your Handshake experience
- Information from your transcript is already uploaded
- Fill in the Summary/Bio section
- Fill in yor past jobs and experiences, including all the bullet points you use on your resume
- Add a professional headshot and background photo

Remember: every word in your profile will be searchable by students and employers

employers are

5X MORE LIKELY

to view a profile that has at least one job/skill/organization

2. APPLY FOR JOBS

- Search for job titles, employers, or skills
- . Apply for interesting jobs that meet your skill set

3. RESEARCH COMPANIES

- Under the "Jobs" Tab there is an "Employers" Tab
- Search for keywords or locations to find companies that are the right fit for you
- Plan to attend their info sessions on BYU Campus, connect with them at Career Fairs, or set up informational interviews to learn more

Remember: when looking at companies or jobs, Handshake will tell you what other BYU students have worked there. Use this resource to network and discover more information!

4. EXPLORE FELLOW STUDENTS

- "Students" tab
- Search for fellow BYU students to view their profiles and job positions (Facebook stalking... "networking")

5. ATTEND EVENTS

- The "Events" tab will be your key to attending info sessions, interviews, and Career Fairs
- The "Calendar" tab under "Events" will show you what events are coming soon
- Make sure to save events you are interested in or RSVP so you do not forget to attend
- Spread the word to your friends on social media

6. DOWNLOAD HANDSHAKE APP

- Search: "Handshake" not "Handshake Career Services"
- Input your BYU e-mail address: netID@byu.edu (it will forward emails to the e-mail you have on file with BYU)
- Handshake will send you a link via e-mail to enable your account in the app
- Navigate the app to perform all the functions of the website that have been previously mentioned

7. VISIT THE CAREER STUDIO

- Freshen up your resume, cover letter, or LinkedIn
- Receive networking help
- Practice interviewing with a mock interview
- Meet with a full-time Career Counselor in your field

8. GET A JOB, RING THE BELL

 Once you're hired, stop by the Career Studio to ring our Victory Bell and get a picture for the Victory Board



BYU CAREER SERVICES careers.byu.edu 1134 WSC (801) 422-3000

Possible Careers with a Biochemistry major

(Not a comprehensive list)

Agricultural engineer Agricultural research

Agronomist* Biotechnologist

Chemical safety engineer

Chemist

Forensic scientist
Histopathologist*
Histotechnologist
Immunologist*
Internist*

Independent consultant

Microbiologist*

Neurological surgeon*

Neurologist*
Nuclear physicist*
Nurse anesthetist*
Nurse assistant
Nurse practitioner*

Obstetrician-Gynecologist*
Occupational health nurse
Occupational physician*

Optometrist*
Oral pathologist*
Oral surgeon*
Orthodontist*

Orthopedic surgeon*
Osteopathic physician*
Otolaryngologist*

Paleontologist*
Lab Researcher

Pathologist*
Pediatric dentist*
Pediatrician*
Perfusionist

Phlebotomist Physiatrist*

Physical therapist*

Physician*

Physician assistant*
Physician executive*
Physician scientist*
Physiologist*
Plastic surgeon*
Podiatrist*

Preventive medicine physician*

Prosthetist and orthotist* Public health physician*

Radiologist*
Registered nurse
Respiratory therapist
Sanitation engineer

Sports medicine physician*

Surgeon*

Surgical technologist Thoracic surgeon* Toxicologist* Urologist* Veterinarian*

Veterinary technician

Zoologist*

Companies that have hired our graduates

Neutraceutical, International Schlumberger IBC Advanced Technologies MoxTek NuSkin Millenniata

Intel ThermoFisher Scientific

NIH Beyond Labz

^{*}Usually requires a graduate degree