

Welcome to the

Physics Education Major

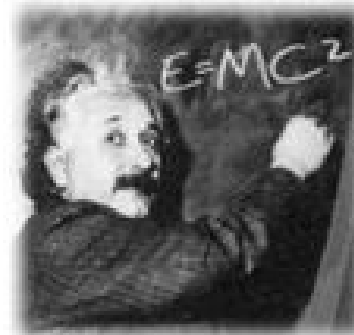
in the College of Computational, Mathematical, and Physical Sciences

College Advisement Center

Website: <https://science.byu.edu/advisement>
Email: science.math.advisement@byu.edu
Phone: 801-422-2674
Office: N-181 ESC

Physics & Astronomy Department

Website: physics.byu.edu
Email: physics_office@byu.edu
Phone: 801-422-4361
Office: N284 ESC



Faculty Advisor – Adam Bennion
Email: adam_bennion@byu.edu
Phone: 801-422-3095
Office: N-319 ESC

Education Advisement Center

Website: education.byu.edu
Email: eac.frontdesk@byu.edu
Phone: 801-422-3426
Office: 175 MCKB

Admission into the Physics Education major or minor requires the following: 1) 2.7 minimum high school/college GPA (be in the average of 3.0 for cohort), 2) fingerprint background check, 3) a cohort average ACT score of 21.25 (17 minimum) in reading, average cohort score of 21.25 (17 minimum) in math, and an average cohort writing score of 6.60 (5 minimum) or a SAT average cohort reading score of 543.33 (435 minimum), average cohort math score of 532.5 (426 minimum), and an average cohort essay score of 5.30 (4 minimum). Anyone who has not taken the correct ACT or SAT tests will need to take the Praxis Core tests and receive a 165 (132 minimum) for writing, 162.14 (130 minimum) for math, and 168.06 (134 minimum) for reading.

Educator: Apply to the program at educator.byu.edu. If you have any technical issues, contact the EPP Help Center at 801-422-1190, <https://epp.byu.edu/>. You should plan to have the application completely done by the time you finish the PHY S 276 class.

Clubs

Acoustical Society of America – Contact: Micah Shepherd (shep@physics.byu.edu), visit www.acoustics.byu.edu/asa-student-chapter for more information

BYU Astronomical Society – Contact: Benjamin Boizelle (boizellb@byu.edu), visit www.physics.byu.edu/clubs/astrosoc/home for more information

Society of Physics Students – Contact: Chris Verhaaren (verhaaren@physics.byu.edu), visit www.sps.byu.edu/sp-s-home for more information

Learning Outcomes can be found here: <https://learningoutcomes.byu.edu/Courses/program-courses/694828/Physics+Teaching+BS+/1328>

Things to Know

Resources for Graduation Planning

- Flow Charts and Major Academic Plans (MAPs) can be found here: <https://science.byu.edu/advisement/explore-majors-and-minors>.
- 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.
- Consider meeting with a faculty advisor in your department. Contact info is found on the 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-104 BNSN, 801-422-6261, <https://chem.byu.edu/department/faculty/>
 - 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

- Check out Careers & Experiential Learning in 1134 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).
- Consider taking StDev 317 (Career Strategies) your junior year.
- Consider taking either Chem 502, CS 502, Geol 502, Math 502, PHSCS 502, or STAT 502 (1-credit Networking Class). Class is held for 1 hour each week.

BS in Physics Education (694828) MAP Sheet

Physical and Mathematical Sciences, Physics and Astronomy

For students entering the degree program during the 2024-2025 curricular year

This major is designed to prepare students to teach in public schools. In order to graduate with this major, students are required to complete Utah State Office of Education licensing requirements.

To view these requirements go to <http://education.byu.edu/ess/licensing.html> or contact Education Advisement Center, 175 MCKB, 801-422-3426.

University Core and Graduation Requirements				Suggested Sequence of Courses				
University Core Requirements:				FRESHMAN YEAR		JUNIOR YEAR		
	Requirements	# Classes	Hours	Classes				
Religion Cornerstones				<u>1st Semester</u>		<u>5th Semester</u>		
	Teachings and Doctrines of the Book of Mormon	1	2.00	REL A 275	PHSCS 121	3.00	PHSCS 127	3.00
	Jesus Christ and the Everlasting Gospel	1	2.00	REL A 250	UNIV 101	2.00	Physics Elective 1	3.00
	Foundations of the Restoration	1	2.00	REL C 225	PHSCS 191	0.50	IP&T 373	1.00
	The Eternal Family	1	2.00	REL C 200	MATH 112	4.00	WRTG 316	3.00
					First Year Writing	3.00	GE Arts, Letters, Sciences	3.00
					Religion Cornerstone Class	2.00	GE Religion	2.00
					Total Hours:	14.50	Total Hours:	15.00
BYU Foundations for Student Success				<u>2nd Semester</u>		<u>6th Semester</u>		
	Foundations for Student Success	1	2.00	UNIV 101	PHSCS 123	3.00	SC ED 353	2.00
The Individual and Society								
	American Heritage	1 to 2	3.00-6.00	from approved list	MATH 113	4.00	SC ED 375	3.00
	Global and Cultural Awareness	1	3.00	SC ED 353*	GE Arts, Letters, Sciences	3.00	PHSCS 310 or 311	3.00
Skills								
	First Year Writing	1	3.00	from approved list	American Heritage	3.00	Physics Elective 2	3.00
	Advanced Written and Oral Communications	1	3.00	PHSCS 416 or WRTG 316	Religion Cornerstone Class	2.00	GE Arts, Letters, Sciences	3.00
	Quantitative Reasoning	1	4.00	MATH 112*	Total Hours:	15.00	GE Religion	2.00
	Languages of Learning (Math of Language)	1	4.00	MATH 112*	Total Hours:	16.00	Total Hours:	16.00
Arts, Letters and Sciences (Complete 6 of 7)				SOPHMORE YEAR		SENIOR YEAR		
	Civilization 1	1	3.00	from approved list	<u>3rd Semester</u>		<u>7th Semester</u>	
	Civilization 2	1	3.00	from approved list	PHSCS 220	3.00	Physics Elective 3	3.00
	Arts	1	3.00	from approved list	PHSCS 225	2.00	PHY S 377	3.00
	Letters	1	3.00	from approved list	MATH 302	4.00	PHY S 378	1.00
	Biological Science	1	3.00-4.00	from approved list	PHY S 276	4.00	CPSE 402	2.00
	Physical Science	2	3.00	PHSCS 222*	Religion Cornerstone Class	2.00	GE Arts, Letters, Sciences	3.00
	Social Science	1	3.00	from approved list	Total Hours:	15.00	GE Religion	2.00
Core Enrichment: Electives				<u>4th Semester</u>		<u>8th Semester</u>		
	Religion Electives	3 to 4	6.00	from approved list	PHSCS 222	3.00	PHY S 476R or 496R	12.00
	Open Electives	Variable	Variable	personal choice	PHSCS 240	2.00	Total Hours:	12.00
Graduation Requirements:								
	Minimum residence hours required		30.00		MATH 303	4.00		
	Minimum hours needed to graduate		120.00		IP&T 371	1.00		
					IP&T 372	1.00		
					GE Arts, Letters, Sciences	3.00		
					Religion Cornerstone Class	2.00		
					Total Hours:	16.00		
*These classes fill both university core and program requirements								

Program Requirements

Licensure: This program meets the educational requirements designed to lead to an occupationally required professional license or certificate in the state of Utah. Students pursuing occupations requiring a license or certificate in a state other than Utah should contact the appropriate BYU academic advisement center as well as the licensing agency in the state where they intend to work to seek information and guidance regarding licensure and certification requirements.

This major is designed to prepare students to teach in public schools. In order to graduate with this major, students are required to complete Utah State Office of Education licensing requirements. To view these requirements go to <https://www.schools.utah.gov/curr/licensing> or contact the Education Advisement Center, 350 MCKB, 801-422-3426.

For students accepted into the major after December 16, 2019, grades below C in any required coursework in a teaching major or teaching minor will not be accepted. Teacher candidates must maintain a cumulative GPA of 2.7 or higher once admitted into the program and to qualify for student teaching. For additional details on admission and retention requirements for teaching majors and teaching minors, see Educator Preparation Program Requirements in the Undergraduate Catalog.

A teaching minor is not required for licensure. However, it is strongly recommended.

Requirement 1 — Complete 10 Courses

Note: Phscs 191 should be taken the first semester.

MATH 112 - Calculus 1 4.0

MATH 113 - Calculus 2 4.0

PHSCS 121 - Intro to Newtonian Mechanics 3.0

PHSCS 123 - Intro to Waves, Optics, Thermo 3.0

PHSCS 127 - Descriptive Astronomy 3.0

PHSCS 191 - Intro Phscs Careers & Rsrch 1 0.5

PHSCS 220 - Intro Electricity & Magnetism 3.0

PHSCS 222 - Modern Physics 3.0

PHSCS 225 - Intro to Experimental Physics 2.0

PHSCS 240 - Dsgn, Fabricatn, Sci Apparatus 2.0

Requirement 2 — Complete 1 of 3 Options

Option 2.1 — Complete 2 Courses

MATH 302 - Math for Engr 1 4.0

MATH 303 - Math for Engineering 2 4.0

Option 2.2 — Complete 4 Courses

MATH 213 - Elementary Linear Algebra 2.0

MATH 215 - Computational Linear Algebra 1.0

MATH 314 - Calculus of Several Variables 3.0

MATH 334 - Ordinary Differential Equation 3.0

Requirement 3 — Complete 1 of 2 Courses

PHSCS 310 - Physics By Inquiry: Mechanics 3.0

PHSCS 311 - Physics By Inquiry:Electricity 3.0

Requirement 4 — Complete 9 hours

Physics electives: Complete an additional 9 hours from the following (any physics course already taken will not double count).

Option 4.1 — Complete up to 3 hours

Complete UP TO 3.0 hours from the following. Courses from requirement 3 can't be double counted as electives.

PHIL 423R - History&Philosophy of Science - You may take once 3.0

PHSCS 137 - Energy, Climate, Environment 3.0

PHSCS 167 - Desc Acoustics of Music & Spch 3.0

PHSCS 310 - Physics By Inquiry: Mechanics 3.0

PHSCS 311 - Physics By Inquiry:Electricity 3.0

PHSCS 313R - Special Topics in Physics - You may take once 0.5v

Option 4.2 — Complete up to 9 hours

Complete AT LEAST 6 hours from 300-, 400-, or 500-level physics courses, not including 310 or 311 or 399R (Phscs 321, 461, and 471 are highly recommended).

PHSCS 313R - Special Topics in Physics - You may take once 0.5v

PHSCS 318 - Intro Math Physics 3.0

PHSCS 321 - Mechanics 3.0

PHSCS 329 - Observational Astronomy 3.0

PHSCS 330 - Computational Physics Lab 2 1.0

PHSCS 360 - Statistical & Thermal Physics 3.0

PHSCS 391R - Seminar in Current Physics - You may take once 1.0

PHSCS 416 - Writing in Physics 3.0

PHSCS 427 - Stellar Astrophysics 3.0

PHSCS 428 - Galaxies and Cosmology 3.0

PHSCS 430 - Computational Physics Lab 3 1.0

PHSCS 441 - Electricity & Magnetism 3.0

PHSCS 442 - Electrodynamics 3.0

PHSCS 451 - Quantum Mechanics 3.0

PHSCS 452 - Appl Quantum Mechanics 3.0

PHSCS 461 - Introduction to Acoustics 3.0

PHSCS 471 - Principles of Optics 3.0

PHSCS 477R - Sec Minor Student Teaching - You may take once 4.0

PHSCS 492R - Capstone in Applied Phscs - You may take once 0.5v

PHSCS 497R - Research in Physics - You may take once 1.0v

PHSCS 498R - Senior Thesis - You may take once 0.5v

PHSCS 540 - Elect Eng Princpls & Practice 2.0

PHSCS 560 - Acoustical Measurement Methods 3.0

PHSCS 561 - Fundamentals of Acoustics 3.0

PHSCS 571 - Lasers & Atoms 3.0

PHSCS 581 - Solid State Physics 3.0

PHSCS 583 - Nano and Surface Phscs 3.0

PHSCS 585 - Thin-Film Physics 3.0

PHSCS 586 - Trans Electron Microscopy 3.0

PHSCS 587 - Semiconductor Devices Phscs 3.0

PHSCS 588 - Scanning Electron Microscopy 3.0

PHSCS 599R - Academic Internship - You may take once 0.5v

Requirement 5 — Complete 2 Requirements

Professional Education Component:

Licensure requirements: Contact the Education Advisement Center, 350

MCKB, 801-422-3426, to schedule the final interview to clear your

application for the secondary teaching license. You should be registered for your last semester at BYU prior to the scheduled appointment.

Requirement 5.1 — Complete 9 Courses

CPSE 402 - Educ Stndts w/Disablt in ScEd 2.0

IP&T 371 - Integrating K-12 Ed Tec 1 1.0

IP&T 372 - Integrating K-12 in El. Ed. 1.0

IP&T 373 - Tchng K-12 Online/Blended Lrn 1.0

PHY S 276 - Exploration of Teaching 4.0

PHY S 377 - Teaching Methods & Instruction 3.0

PHY S 378 - Practicum in Secondary Educ 1.0

SC ED 353 - Multicultural Educ 2.0

SC ED 375 - Ad Dev & Class Mgmt 3.0

Note: FBI fingerprint and background clearance must be completed prior to enrollment in Phy S 276.

Requirement 5.2 — Complete 12 hours

PHY S 476 - Secondary Student Teaching 0.0v

PHY S 496 - Acad Intern: Secondary Ed 0.0v

Student teachers/interns must complete three forms in their Educator accounts (PIBS, CDS, FED) and attach their TWS to the Educator account for their program. All four must be completed to be cleared for graduation.

THE DISCIPLINE:

Over the centuries physicists and astronomers have studied the fundamental principles that govern the structure and dynamics of matter and energy in the physical world, from subatomic particles to the cosmos. Physicists also apply this understanding to the development of new technologies. For example, physicists invented the first lasers and

semiconductor electronic devices.

Physics and astronomy students learn to approach complex problems in science and technology from a broad background in mechanics, electricity and magnetism, statistical and thermal physics, quantum mechanics, relativity, and optics. The tools they develop at BYU include problem solving by mathematical and computational modeling, as well as experimental discovery and analysis. All students gain professional experience in a research, capstone, or internship project, usually in close association with faculty. Together these experiences can provide excellent preparation for employment or for graduate studies in physics, other sciences, engineering, medicine, law, or business.

Most physicists and astronomers work in research and development in industrial, government, or university labs to solve new problems in technology and science. They also share the beauty discovered in our physical universe by teaching in high schools, colleges, and universities.

CAREER OPPORTUNITIES:

A degree in physics or physics-astronomy can provide:

1. Preparation for those who intend to enter industrial or governmental service as physicists or astronomers.
2. Education for those who intend to pursue graduate work in physics or astronomy.
3. Education in the subject matter of physics for prospective teachers of the physical sciences.
4. Undergraduate education for those who will pursue graduate work in the professions: business (e.g., an MBA), law, medicine, etc.
5. Fundamental background for other physical sciences and engineering, in preparation for graduate study in these fields.
6. Physics fundamentals required by the biological science, medical, dental, nursing, and related programs.

For more information, see www.physics.byu.edu/undergraduate/careers.

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 Physics and Astronomy

Brigham Young University

N-283 ESC

Provo, UT 84602

Telephone: (801) 422-4361

physics_office@byu.edu

ADVISEMENT CENTER INFORMATION

Computational, Mathematical, & Physical Sciences Brigham

Young University

N-181 ESC

Provo, UT 84602

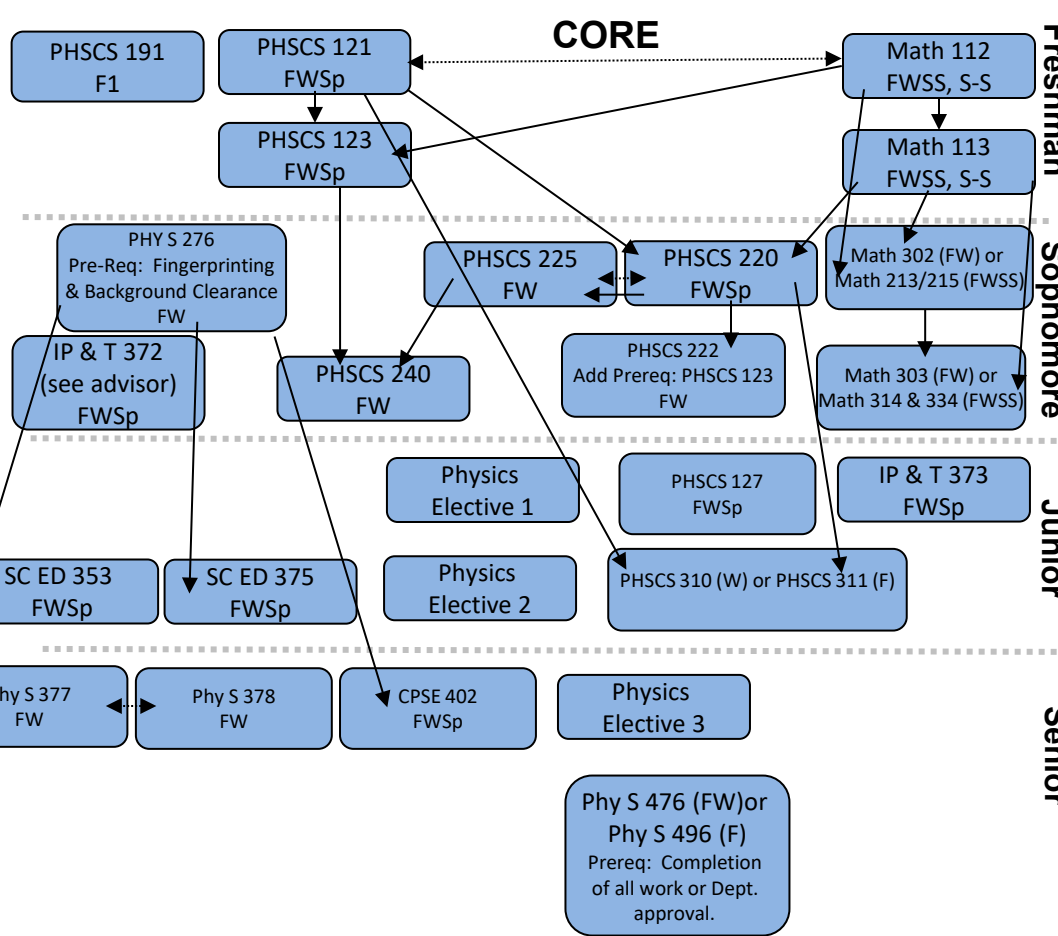
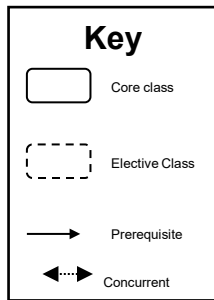
Telephone: (801) 422-2674

Physics Education BS

Requirements / Prerequisites
2024-2025 Academic Year

Major (77.5-78.5 Hours)

- Admission into the major or minor requires the following:
 - 2.7 minimum high school/college GPA (be in the average of 3.0 for cohort),
 - 2) fingerprint background check,
 - 3) a cohort average ACT score of 21.25 (17 minimum) in reading, average cohort score of 21.25 (17 minimum) in math, and an average cohort writing score of 6.60 (5 minimum) **or** a SAT average cohort reading score of 543.33 (435 minimum), average cohort math score of 532.5 (426 minimum), and an average cohort essay score of 5.30 (4 minimum). Anyone who has not taken the correct ACT or SAT tests will need to take the Praxis Core tests and receive a 165 (132 minimum) for writing, 162.14 (130 minimum) for math, and 168.06 (134 minimum) for reading.
- Grades below C in professional education courses or content courses will not be accepted. Teacher candidates must have minimum of a cumulative 2.7 GPA.
- Complete the following: Math 112, Math 113, PHSCS 121, PHSCS 123, PHSCS 127, PHSCS 191, PHSCS 220, PHSCS 222, PHSCS 225, PHSCS 240.
- Complete one of the following math options: Take either Math 302 and Math 303 OR Math 213, Math 215, Math 314, and Math 334.
- Complete one of the following: PHSCS 310 or PHSCS 311.
- Complete 9 hours from the following. Three hours may come from list A. and up to 9 credits may come from list B (at least 6 credits must come from list B).
 - Phil 423R, PHSCS 137, PHSCS 167, PHSCS 310, PHSCS 311, PHSCS 313R.
 - PHSCS 313R, PHSCS 318, PHSCS 321, PHSCS 329, PHSCS 330, PHSCS 360, PHSCS 391R, PHSCS 416, PHSCS 427, PHSCS 428, PHSCS 430, PHSCS 441, PHSCS 442, PHSCS 451, PHSCS 452, PHSCS 461, PHSCS 471, PHSCS 477R, PHSCS 492R, PHSCS 497R, PHSCS 498R, PHSCS 540, PHSCS 560, PHSCS 561, PHSCS 571, PHSCS 581, PHSCS 583, PHSCS 585, PHSCS 586, PHSCS 587, PHSCS 588, PHSCS 599R. See Catalog or MyMAP for Pre-reqs.
- Complete the Professional Education Component: CPSE 402, IP&T 371, IP&T 372, IP&T 373, PHY S 276, Phy S 377, PHY S 378, SC ED 353, SC ED 375
- Take either PHY S 476 or Phy S 496



Physics Education Minor (27 Credits)

- Take the following 7 courses: Math 113, PHSCS 121, PHSCS 123, PHSCS 220, PHSCS 222, PHSCS 225, PHSCS 240.
- Take Phy S 377
- Take PHSCS 477R

Note: When Taught is subject to change.

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 your 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

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



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!

Possible Careers with a Physics major

(Not a comprehensive list)

Accelerator operator	Manager, esp. high-tech industry
Acoustician	Materials scientist*
Aerodynamicist*	Mathematician*
Aerospace Scientist	Medical doctor*
Astronomer*	Medical physicist*
Biophysicist*	Meteorologist
Biotechnologist	Nanotechnology microscopist
Business administration, esp. high-tech industry	National security analyst
Business, self-employed	Neurologist*
Computer scientist (many types: financial software developer, hardware engineer, IT consultant, programmer, software engineer, systems analyst, web developer, etc.)	Noise and vibration engineer
Dentist*	Nuclear medicine technologist
Data Scientist	Nuclear pharmacist*
Engineer (many types: Aerospace, Chemical, Electrical, Electro-optic, Mechanical, Medical device, Nuclear, Optical/laser, Semiconductor device, Manufacturing, Design, Process, Quality Control, Research & Development, Systems, etc.)	Optical Scientist*
Financial analyst	Patent agent or lawyer*
Geophysicist*	Physicist* (many types: Astrophysics, Atomic & Molecular, Biological, Condensed Matter, Nuclear, Optical & Photonic, Particle, Plasma & Fusion, etc.)
Hazardous waste management specialist	Professor* (university, college, community college)
Health physicist*	Research lab assistant, research technician
Lawyer (esp. patents)*	Sales, esp. high-tech industry
	Space scientist
	Scientific computer programmer
	Teacher (high school physics, high school science, middle school science)

*Usually requires a graduate degree

Gathered from the Counseling and Career Center and from the American Institute of Physics (aip.org)

Research Groups

Group	Day	Time	Location
Acoustics	Thursday	4:00PM	ESC C261
Astronomy	Every other Thursday	10:00AM	ESC N485
Atomic, Molecular, Optical Computational X-ray Imaging	Contact individual professors		
Condensed Matter	Wednesday	3:00PM	ESC N288
Materials for Space Observatories	Thursday	4:00PM	ESC N288
Quantum	Monday	2:00PM	ESC N265
Science Education	Thursday	2:00PM	ESC N309
Theoretical and Mathematical	Thursday	10:00AM	ESC N209
	Tuesday	3:00PM	ESC N209

*For most updated information on times and locations of research groups, please visit: <https://www.physics.byu.edu/undergraduate/research> Be sure to scroll down to the professors for additional information.