

Welcome to the

Applied Physics Major

in the College of Physical and Mathematical Sciences

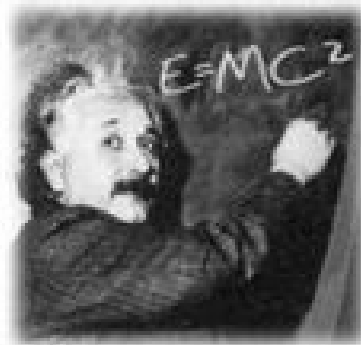
College Advisement Center

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

Physics & Astronomy Department

Website: physics.byu.edu
Email: physics_office@byu.edu
Phone: 801-422-4361
Office: N-284 ESC

See physics.byu.edu/undergraduate/advising



Faculty Advisor – until you have a faculty research mentor, you must meet annually to discuss career and academic options with the faculty advisor assigned to you based on the last two digits of your BYU ID:

- 00-24: David Allred, allred@byu.edu (801) 422-3489, N-265 ESC
- 25-49: Grant Hart, grant_hart@byu.edu (801) 422-6162, N-357 ESC
- 50-74: David Neilsen, david.neilsen@byu.edu, (801) 422-6078, N-147 ESC
- 75-99: Jean-Francois Van Huele, vanhuele@byu.edu, (801) 422-4481, N-235 ESC

Deadlines to meet with Faculty Advisors each year (based on the last digit of your student number):

0 or 1	2 or 3	4 or 5	6 or 7	8 or 9
October 31	November 30	January 31	February 28	March 31

Internship Coordinator – David Allred

Email: allred@byu.edu
Phone: 801-422-3489
Office: N265 ESC

University Career Services – Anna Kennington

Website: careers.byu.edu (Handshake--see flyer in packet)
Email: anna.kennington@byu.edu
Phone: 801-422-5944
Office: C-106 BNSN

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

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: Benjamin Frandsen (benfrandsen@byu.edu), visit www.sps.byu.edu/sps-home for more information

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-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

- 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 Job Search Class). Class is held for 1 hour each week.

BS in Applied Physics (694825) MAP Sheet

Physical and Mathematical Sciences, Physics and Astronomy

For students entering the degree program during the 2023-2024 curricular year.



University Core and Graduation Requirements				Suggested Sequence of Courses			
University Core Requirements:				FRESHMAN YEAR			
Requirements	#Classes	Hours	Classes	1st Semester		JUNIOR YEAR	
Religion Cornerstones				5th Semester			
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275	PHSCS 121 (FWSp)	3.0	PHSCS 245 (FW)	2.0
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250	PHSCS 191 (F)	0.5	PHSCS 318 (FW)	3.0
Foundations of the Restoration	1	2.0	REL C 225	MATH 112 (FWSpSu)	4.0	PHSCS 321 (FSp)	3.0
The Eternal Family	1	2.0	REL C 200	First-year Writing	3.0	PHSCS 330 (FSp)	1.0
The Individual and Society				General Electives	2.0	Social Science	3.0
American Heritage	1-2	3-6.0	from approved list	Religion Cornerstone course	2.0	Religion elective	2.0
Global and Cultural Awareness	1	3.0	from approved list	Total Hours	14.5	Total Hours	14.0
Skills				2nd Semester		6th Semester	
First Year Writing	1	3.0	from approved list	PHSCS 123 (FWSp)	3.0	PHSCS 430 (WSu)	1.0
Advanced Written and Oral Communications	1	3.0	PHSCS 416 or WRTG 316	MATH 113 (FWSpSu)	4.0	Applied Physics Elective 1	3.0
Quantitative Reasoning	1	4.0	MATH 112*	C S 111 (FWSp)	3.0	Applied Physics Elective 2	3.0
Languages of Learning (Math or Language)	1	4.0	MATH 112*	American Heritage	3.0	Arts	3.0
Arts, Letters, and Sciences				Religion Cornerstone course	2.0	Global & Cultural Awareness	3.0
Civilization 1	1	3.0	from approved list	Total Hours	15.0	Religion Elective	2.0
Civilization 2	1	3.0	from approved list	SOPHOMORE YEAR		Total Hours	15.0
Arts	1	3.0	from approved list	3rd Semester		SENIOR YEAR	
Letters	1	3.0	from approved list	PHSCS 220 (FWSp)	3.0	7th Semester	
Biological Science	1	3-4.0	from approved list	PHSCS 225 (FW)*	2.0	PHSCS 441 (FSp)	3.0
Physical Science	1	3.0	PHSCS 222*	PHSCS 230 (FW)	1.0	Applied Physics Elective 3	3.0
Social Science	1	3.0	from approved list	PHSCS 291 (F)	0.5	Civilization 1	3.0
Core Enrichment: Electives				MATH 302 (FW)**	4.0	Letters	3.0
Religion Electives	3-4	6.0	from approved list	Biological Science	3.0	General Elective	2.0
Open Electives	Variable	Variable	personal choice	Religion Cornerstone course	2.0	Religion Elective	2.0
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (7 hours overlap)				Total Hours	15.5	Total Hours	16.0
Graduation Requirements:				4th Semester		8th Semester	
Minimum residence hours required		30.0		PHSCS 222 (FWSp)	3.0	PHSCS 416 (W)	3.0
Minimum hours needed to graduate		120.0		PHSCS 240 (FW)	2.0	PHSCS 442 (WSu) or PHSCS 471 (WSu) or EC EN 466 (F)	3.0
				MATH 303 (FW)	4.0	Applied Physics elective 4	3.0
				General Elective	3.0	PHSCS 492R or PHSCS 498R (Senior thesis or capstone credit; FWSpSu)	2.0
				Religion cornerstone course	2.0	General Elective	2.0
				Total Hours	14.0	Civilization 2	3.0
						Total Hours	16.0
				Note: 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 cost and the number of semesters to graduate.			

Requirement 1- Complete 17 Courses

C S 111 - Intro to Computer Science 3.0
MATH 113 - Calculus 2 4.0
PHSCS 121 - Intro to Newtonian Mechanics 3.0
PHSCS 123 - Intro to Waves, Optics, Thermo 3.0
PHSCS 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 230 - Computational Physics Lab 1 1.0
PHSCS 240 - Dsgn, Fabricatn, Sci Apparatus 2.0
PHSCS 245 - Experiments in Contemp Phscs 2.0
PHSCS 291 - Intro Phscs Careers & Rsrch 2 0.5
PHSCS 318 - Intro Math Physics 3.0
PHSCS 321 - Mechanics 3.0
PHSCS 330 - Computational Physics Lab 2 1.0
PHSCS 430 - Computational Physics Lab 3 1.0
PHSCS 441 - Electricity & Magnetism 3.0

Requirement 2 — Complete 1 of 3 Courses

Note: Although Ec En 466 has some Ec En classes listed as prerequisites, they are often waived for Applied Physics majors. Specifically, Ec En 466 can be taken with no other prereqs as long as the student has taken Phscs 441. However, it is still recommended for students who have taken Phscs 441 to also take Phscs 442 or Ec En 462 prior to taking Ec En 466. Interested students should talk to the Ec En 466 instructor about their specific backgrounds.

EC EN 466 - Intro to Optical Engineering 2.0
PHSCS 442 - Electrodynamics 3.0
PHSCS 471 - Principles of Optics 3.0

Requirement 3 — Obtain confirmation from your advisement center that you have completed the following:

After gaining department advisor's approval of courses selected to define an option, complete an additional 12 hours of electives (cannot include any courses already taken above). These 12 hours must consist of a coherent set of upper-division courses with an identified educational goal. Nine hours must be upper division (300-level or above); three hours must be 200-level or above.

Requirement 4 — Complete 1 of 2 Options**Option 4.1 — Complete 2 Courses**

MATH 302 - Math for Engr 1 4.0
MATH 303 - Math for Engineering 2 4.0

Option 4.2 — 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 5 — Complete 2 hours

Complete a capstone project or senior thesis including the following:

A. Choose a research mentor and group as early as possible, starting with information in Phscs 191 and 291, and discussions with faculty, your advisor, and the capstone project coordinator or senior thesis coordinator. It is best to start as a freshman or sophomore. Interdisciplinary work in other departments or in internships is possible.

Option 5.1 — Complete up to 2 hours

B. Complete 2 hours of one of the following:

PHSCS 492R - Capstone in Applied Phscs - *You may take up to 2.0 credit hours* 2.0
PHSCS 498R - Senior Thesis - *You may take up to 2.0 credit hours* 0.5

Requirement 6 — Obtain confirmation from your advisement center that you have completed the following:

Students are required to take the Physics "Major Field Test" the last semester before they graduate. The test is a standardized assessment of undergraduate physics written by ETS (Educational Testing Service). The ETS website contains a description of the exam and sample problems: <http://www.ets.org/mft/about/content/physics>. Results of the exam do not appear on the transcript or affect the GPA. Students should contact the Physics undergraduate secretary to make arrangements for taking the exam; typically it's done in the Testing Center before mid-semester.

Note 1: Students planning careers in experimental, applied, or industrial physics should complete Stat 201.

Note 2: All students will benefit, through courses or individual study, by learning programming skills and numerical methods beyond what you are taught in C S 111 and our computational physics courses. Consider the following: CS courses, Math 410, Me En 373.

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.

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 students 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.

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

FACULTY ADVISORS ASSIGNED BY LAST TWO DIGITS OF BYU ID NUMBER.
CONTACT:

Department of Physics and Astronomy

Brigham Young University
N-283 ESC
Provo, UT 84602
Telephone: (801) 422-4361

ADVISEMENT CENTER INFORMATION**Physical and Mathematical Sciences College Advisement Center**

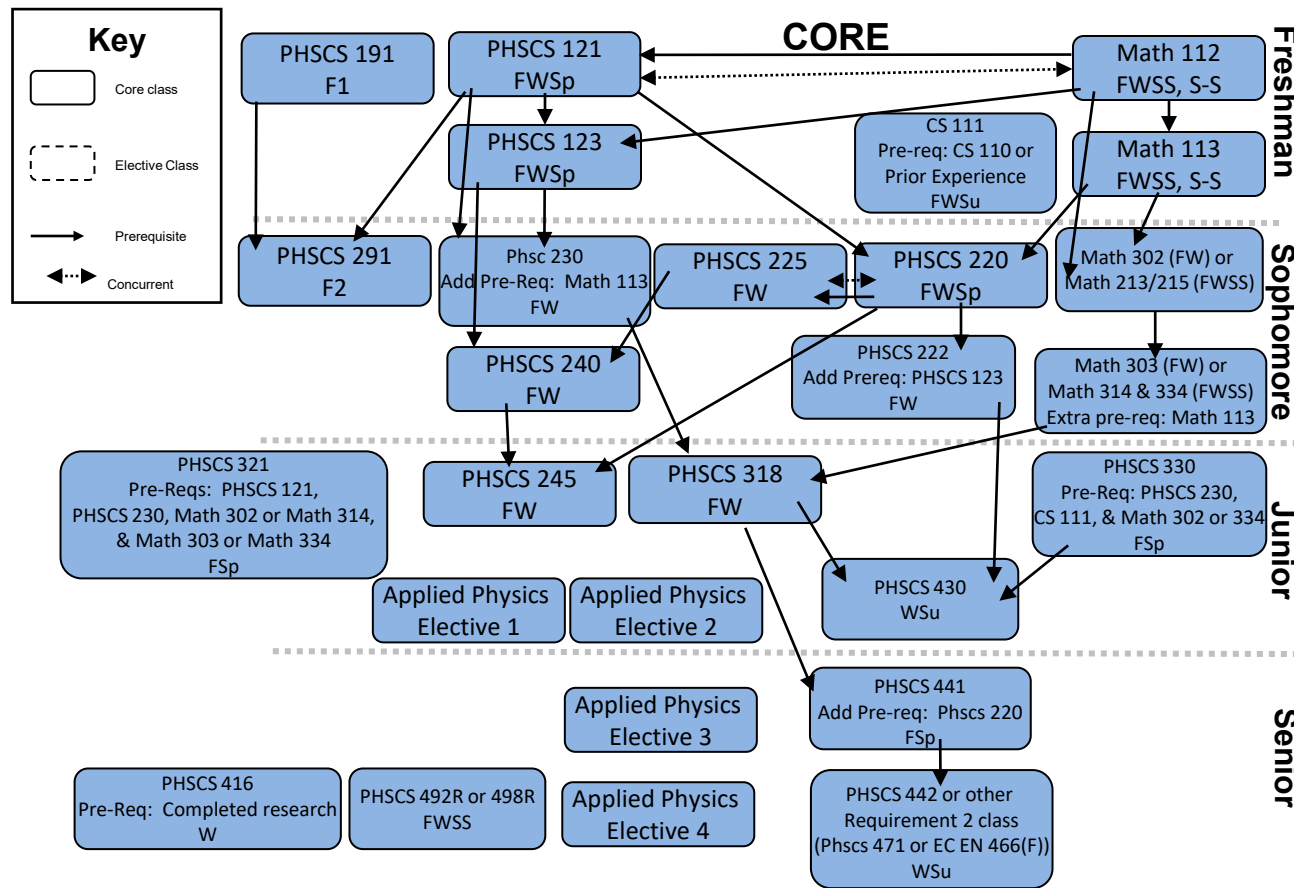
Brigham Young University
N-181 ESC
Provo, UT 84602
Telephone: (801) 422-2674

Applied Physics BS

Requirements / Prerequisites 2023-2024 Academic Year

Major (62-64 Hours)

- No more than 3 Hours of D credit is allowed in major courses.
- Complete the following: CS 111, Math 113, PHSCS 121, PHSCS 123, PHSCS 191, PHSCS 220, PHSCS 222, PHSCS 225, PHSCS 230, PHSCS 240, PHSCS 245, PHSCS 291, PHSCS 318, PHSCS 321, PHSCS 330, PHSCS 430, PHSCS 441.
- Complete one of the following: EC EN 466, PHSCS 442, or PHSCS 471.
- After gaining department advisor's approval of courses selected to define an option, complete an additional 12 hours of electives (cannot include any courses already taken above). These 12 hours must consist of a coherent set of upper-division courses with an identified educational goal. Nine hours must be upper division (300 or above); three hours must be 200-level or above.
- 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 two credits from either PHSCS 492R or PHSCS 498R.
- Take the Physics Major Field Test your last semester.



Physics Minor

- Complete the following 5 courses: Math 113, PHSCS 121, PHSCS 123, PHSCS 220, PHSCS 222.
- Complete 4.0 hours from the following courses: PHSCS 127, PHSCS 137, PHSCS 167, PHSCS 225, PHSCS 230, PHSCS 240, PHSCS 310, PHSCS 311, PHSCS 318, PHSCS 321, PHSCS 330

After gaining department advisor's approval of courses selected to define an option, complete an additional 12 hours of electives (cannot include core courses in the major). These 12 hours must consist of a coherent set of upper-division courses with an identified educational goal. Nine hours must be upper division (300 or above); three hours must be 200-level or above. See examples of applied physics tracks here: <https://physics.byu.edu/undergraduate/appliedphysics>.

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
Acoustician
Aerodynamicist*
Astronomer*
Biophysicist*
Biotechnologist
Business administration, esp. high-tech industry
Business, self-employed
Computer scientist (many types: financial software developer, hardware engineer, IT consultant, programmer, software engineer, systems analyst, web developer, etc.)
Dentist*
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.)
Financial analyst
Geophysicist*
Hazardous waste management specialist
Health physicist*
Lawyer (esp. patents)*

Manager, esp. high-tech industry
Materials scientist*
Mathematician*
Medical doctor*
Medical physicist*
Meteorologist
Nanotechnology microscopist
National security analyst
Neurologist*
Nuclear medicine technologist
Nuclear pharmacist*
Optical Scientist*
Patent agent or lawyer*
Physicist* (many types: Astrophysics, Atomic & Molecular, Biological, Condensed Matter, Nuclear, Optical & Photonic, Particle, Plasma & Fusion, etc.)
Professor* (university, college, community college)
Research lab assistant, research technician
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	Contact individual professors		
Computational X-ray Imaging	Wednesday	3:00PM	ESC N288
Condensed Matter	Thursday	4:00PM	ESC N288
Materials for Space	Monday	2:00PM	ESC N265
Observatories	Thursday	2:00PM	ESC N309
Quantum	Thursday	10:00AM	ESC N209
Science Education	Thursday	10:00AM	ESC N209
Theoretical and Mathematical	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.