Welcome to the
Mathematics 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-181ESC

Mathematics Department
Website: https://math.byu.edu
Phone: 801-422-2061
Office: 275 TMCB

Faculty Advisor – Pace Nielsen
Email: pace@mathematics.byu.edu
Phone: 801-422-7884
Office: 242 TMCB

Internship Coordinator – Rynell Lewis
Email: rlewis@mathematics.byu.edu
Phone: 801-422-5925
Office: 283 TMCB

University Career Services – Lane Muranaka
Website: careers.byu.edu (Handshake--see flyer in packet)
Email: lane_muranaka@byu.edu
Phone: 801-422-9360, or 801-422-2674 (schedule appointment)
Office: N221-J ESC

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

Clubs
SIAM—Contact: Check the website http://siam.byu.edu.

Learning outcomes can be found here: https://learningoutcomes.byu.edu/Courses/program-courses/694420/Mathematics+BS+/1326
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.
- 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: 167 TMCB, 801-422-4361, physics_office@byu.edu
  - Statistics: 2152 WVB, 801-422-4505, statsec@stat.byu.edu

Prepare Early for a Career

- 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 per week for eight non-consecutive weeks throughout the semester.
### University Core and Graduation Requirements

#### University Core Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>#Classes</th>
<th>Hours</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religion Cornerstones</strong></td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>Teachings and Doctrine of The Book of Mormon</td>
<td>1</td>
<td>2.0</td>
<td>REL A 275</td>
</tr>
<tr>
<td>Teachings and Doctrine of Jesus Christ and the Everlasting Gospel</td>
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<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>Foundations of the Restoration</td>
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<td>2.0</td>
<td>REL C 225</td>
</tr>
<tr>
<td>The Eternal Family</td>
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<td>2.0</td>
<td>REL C 200</td>
</tr>
<tr>
<td><strong>The Individual and Society</strong></td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>American Heritage</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>First Year Writing</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Advanced Written and Oral Communications</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Quantitative Reasoning</td>
<td>1</td>
<td>4.0</td>
<td>MATH 112* or 113*</td>
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<tr>
<td>Languages of Learning (Math or Language)</td>
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<td>4.0</td>
<td>MATH 112* or 113*</td>
</tr>
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<td><strong>Arts, Letters, and Sciences</strong></td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 1</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Civilization 2</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Arts</td>
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<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Letters</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
</tr>
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<td>Biological Science</td>
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<td>3.0</td>
<td>from approved list</td>
</tr>
<tr>
<td>Physical Science</td>
<td>1</td>
<td>3.0</td>
<td>from approved list</td>
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<tr>
<td>Social Science</td>
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<td><strong>Core Enrichment: Electives</strong></td>
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<tr>
<td>Religion Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
</tr>
<tr>
<td>Open Electives</td>
<td>Variable</td>
<td>Variable</td>
<td>personal choice</td>
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</tbody>
</table>

*These classes fill both university core and program requirements (4 hours overlap)*

#### Graduation Requirements:

- Minimum residence hours required: 30.0
- Minimum hours needed to graduate: 120.0

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### Suggested Sequence of Courses

#### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>1st Semester</th>
<th>Hours</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Writing</td>
<td>3.0</td>
<td>MATH 112</td>
</tr>
<tr>
<td>MATH 191</td>
<td>0.5</td>
<td>MATH 290</td>
</tr>
<tr>
<td>Biological Science</td>
<td>3.0</td>
<td>Religion Cornerstone course</td>
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<tr>
<td>Total Hours</td>
<td>15.5</td>
<td></td>
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<table>
<thead>
<tr>
<th>2nd Semester</th>
<th>Hours</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Heritage</td>
<td>3.0</td>
<td>MATH 314</td>
</tr>
<tr>
<td>MATH 371</td>
<td>3.0</td>
<td>MATH 215</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td>Religion elective</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
<td></td>
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#### SOPHOMORE YEAR

<table>
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<tr>
<th>3rd Semester</th>
<th>Hours</th>
<th>Courses</th>
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</thead>
<tbody>
<tr>
<td>MATH 314</td>
<td>3.0</td>
<td>MATH 191</td>
</tr>
<tr>
<td>MATH 215</td>
<td>2.0</td>
<td>MATH 215</td>
</tr>
<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td>General Education courses, university requirements, and/or general electives</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
<td></td>
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<table>
<thead>
<tr>
<th>4th Semester</th>
<th>Hours</th>
<th>Courses</th>
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<tbody>
<tr>
<td>MATH 334</td>
<td>3.0</td>
<td>MATH 341</td>
</tr>
<tr>
<td>Letters</td>
<td>3.0</td>
<td>STAT 201 or 251</td>
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<tr>
<td>Religion Cornerstone course</td>
<td>2.0</td>
<td>General Electives</td>
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<tr>
<td>Total Hours</td>
<td>14.5</td>
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#### JUNIOR YEAR

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<thead>
<tr>
<th>5th Semester</th>
<th>Hours</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 342</td>
<td>3.0</td>
<td>MATH 413</td>
</tr>
<tr>
<td>Advanced Written &amp; Oral Communication</td>
<td>3.0</td>
<td>Civilization 1</td>
</tr>
<tr>
<td>Religion elective</td>
<td>2.0</td>
<td>General electives</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
<td></td>
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<table>
<thead>
<tr>
<th>6th Semester</th>
<th>Hours</th>
<th>Courses</th>
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<tbody>
<tr>
<td>MATH 352</td>
<td>3.0</td>
<td>Physical Science</td>
</tr>
<tr>
<td>Civilization 2</td>
<td>3.0</td>
<td>Religion elective</td>
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<tr>
<td>General Electives</td>
<td>4.0</td>
<td>General Electives</td>
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<tr>
<td>Total Hours</td>
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#### SENIOR YEAR

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<thead>
<tr>
<th>7th Semester</th>
<th>Hours</th>
<th>Courses</th>
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<tr>
<td>MATH elective 1</td>
<td>3.0</td>
<td>MATH elective 2</td>
</tr>
<tr>
<td>Global &amp; Cultural Awareness</td>
<td>3.0</td>
<td>Religion elective</td>
</tr>
<tr>
<td>General Electives</td>
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<td>General Electives</td>
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<tr>
<td>Total Hours</td>
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<table>
<thead>
<tr>
<th>8th Semester</th>
<th>Hours</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH elective 3</td>
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<td>MATH elective 4</td>
</tr>
<tr>
<td>Arts</td>
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<td>General Electives</td>
</tr>
<tr>
<td>Total Hours</td>
<td>15.0</td>
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</tbody>
</table>

**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.
### BS in Mathematics (694420)
#### 2022-2023 Program Requirements (53.5 Credit Hours)

**Grades of C- or below will not be acceptable in major courses.**

**REQUIREMENT 1** Complete 12 courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 112</td>
<td>Calculus 1</td>
<td>4.0</td>
</tr>
<tr>
<td>MATH 113</td>
<td>Calculus 2</td>
<td>4.0</td>
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</tbody>
</table>

#### CORE REQUIREMENTS:

- **MATH 191** - Seminar in Mathematics 1 0.5
- **MATH 290** - Fundamentals of Mathematics 3.0
- **MATH 314** - Calculus of Several Variables 3.0
- **MATH 334** - Ordinary Differential Equations 3.0
- **MATH 341** - Theory of Analysis 1 3.0
- **MATH 342** - Theory of Analysis 2 3.0
- **MATH 352** - Introduction to Complex Analysis 3.0
- **MATH 371** - Abstract Algebra 1 3.0
- **MATH 413** - Advanced Linear Algebra 3.0

**REQUIREMENT 2** Complete 1 option

**OPTION 2.1** Complete 1 course
- **MATH 313** - (Not currently offered)

**OPTION 2.2** Complete 2 courses
- **MATH 213** - Elementary Linear Algebra 2.0
- **MATH 215** - Computational Linear Algebra 1.0

**REQUIREMENT 3** Complete 1 course

- **C S 235** - Introduction to Computer Science 3.0

**REQUIREMENT 4** Complete 1 course

- **STAT 201** - Statistics for Engineers and Scientists 3.0
- **STAT 251** - Introduction to Bayesian Statistics 3.0

**REQUIREMENT 5** Complete 12.0 hours from the following course(s)

- **C S 225** - Data Structures and Algorithms 3.0
- **MATH 300** - (Math-MthEd) History and Philosophy of Mathematics 3.0
- **MATH 355** - Graph Theory 3.0
- **MATH 362** - (Math-MthEd) Survey of Geometry 3.0
- **MATH 372** - Abstract Algebra 2 3.0
- **MATH 380** - Mathematical Foundations of Data Science 3.0
- **MATH 402** - Modeling with Uncertainty and Data 1 3.0
- **MATH 403** - Modeling with Uncertainty and Data 1 Laboratory 1.0
- **MATH 404** - Modeling with Uncertainty and Data 2 3.0

**REQUIREMENT 6** Complete 11 courses

- **MATH 406R** - Topics in Mathematics 3.0
- **MATH 410** - Introduction to Numerical Methods 3.0
- **MATH 411** - Numerical Methods 3.0
- **MATH 425** - Mathematical Biology 3.0
- **MATH 431** - Probability Theory 3.0
- **MATH 435** - Mathematical Finance 3.0
- **MATH 436** - Modeling with Dynamics and Control 1 3.0
- **MATH 437** - Modeling with Dynamics and Control 1 Laboratory 1.0
- **MATH 438** - Modeling with Dynamics and Control 2 3.0
- **MATH 439** - Modeling with Dynamics and Control 2 Laboratory 1.0
- **MATH 447** - Introduction to Partial Differential Equations 3.0
- **MATH 450** - Combinatorics 3.0
- **MATH 451** - Introduction to Topology 3.0
- **MATH 465** - Differential Geometry 3.0
- **MATH 473** - Group Representation Theory 3.0
- **MATH 485** - Mathematical Cryptography 3.0
- **MATH 487** - Number Theory 3.0
- **MATH 495R** - Readings in Mathematics 2.0
- **MATH 510** - Numerical Methods for Linear Algebra 3.0
- **MATH 511** - Numerical Methods for Partial Differential Equations 3.0
- **MATH 513R** - Advanced Topics in Applied Mathematics 3.0
- **MATH 521** - Methods of Applied Mathematics 1 3.0
- **MATH 522** - Methods of Applied Mathematics 2 3.0
- **MATH 525** - Network Theory 3.0
- **MATH 532** - Complex Analysis 3.0
- **MATH 534** - Introduction to Dynamical Systems 1 3.0
- **MATH 536** - Applied Discrete Probability 3.0
- **MATH 540** - Linear Analysis 3.0
- **MATH 541** - Real Analysis 3.0
- **MATH 547** - Modeling and Analysis of Partial Differential Equations 3.0
- **MATH 553** - Foundations of Topology 1 3.0
- **MATH 554** - Foundations of Topology 2 3.0
- **MATH 561** - Introduction to Algebraic Geometry 1 3.0
- **MATH 562** - Introduction to Algebraic Geometry 2 3.0
- **MATH 565** - Differential Geometry 3.0
- **MATH 570** - Matrix Analysis 3.0
- **MATH 571** - Algebra 1 3.0
- **MATH 572** - Algebra 2 3.0
- **MATH 586** - Introduction to Algebraic Number Theory 3.0
- **MATH 587** - Introduction to Analytic Number Theory 3.0

**RECOMMENDED**

- **ECON 110** - Economic Principles and Problems 3.0
- **PHSCS 121** - Introduction to Newtonian Mechanics 3.0
- **PHSCS 220** - Introduction to Electricity and Magnetism 3.0

**Note 1:** The courses recommended above can be used to fill General Education requirements.

**Note 2:** Students who continue toward graduate work should complete Math 372 or Math 473, as well as Math 541 and Math 553.

**Note 3:** Students who do not plan to pursue a Ph.D. in mathematics are strongly encouraged to complete CS 235.

**THE DISCIPLINE:**

Mathematics is a means of dealing with order, pattern, and number as seen in the world around us. The abilities to compute, to think logically, and to take a reasoned approach to solving problems are highly valued in society and are characteristics of any educated person. Mathematics is not just a body of knowledge, but a process of analysis, reasoning, comparison, deduction, generalization, and problem solving. A mathematician’s stock in trade is the ability to solve problems and to explain the solutions to others. Having once determined what the right questions are, solving problems involves analyzing both concrete and abstract situations, relating them to mathematical ideas and using mathematical techniques to work toward solutions. Explaining the solution involves pointing out what has been solved and why the solution is valid.

**CAREER OPPORTUNITIES:**

Majors in mathematics (BS) prepare for a wide variety of careers. Some enter graduate school or professional schools and prepare...
for careers in such fields as college teaching, consulting, research and development, law, medicine, and business administration. Others take positions in government agencies, industrial laboratories, information management firms, or business organizations. All of them spend much time communicating with colleagues about the problems they are solving as they continue to learn more mathematics and share mathematical ideas with others.

**INTERNSHIP COORDINATOR:**

Rynell Lewis  
283 TMCB  
801-422-5925  
rlewis@mathematics.byu.edu

**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 ADVISOR:**  
Pace Nielsen  
318 TMCB  
Brigham Young University, Provo, UT 84602  
Telephone: (801) 422-7884

**ADVISEMENT CENTER INFORMATION**

Physical and Mathematical Sciences College Advisement Center  
Brigham Young University  
N-181 ESC  
Provo, UT 84602  
Telephone: (801) 422-2674
**Handshake: BYU’s Online Job Board**

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 your 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

   **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
Careers in Mathematics

A degree in mathematics opens doors to a vast number of possible careers. Employers value mathematics majors for their problem-solving skills in general, as well as their specific subject matter expertise. For many careers in mathematics, additional expertise, such as experience in computer programming or statistics, can be very valuable.

In 2009, CareerCast.com evaluated 200 professions to determine the best and the worst. Their conclusion: by their criteria, mathematician is the best of the 200 professions (lumberjack was the worst). For the full list, and a description of the criteria that they used, see the report at https://www.wsj.com/articles/SB123119236117055127

The website WeUseMath.org lists over 40 careers using mathematics, along with their median salary. Among them are:
- Actuary: median salary $93,680 per year
- Biostatistician: median salary $77,860 per year
- Budget Analyst: median salary: $71,590 per year
- Foreign Exchange Trader: median salary $154,786 per year

At www.siam.org/careers/thinking/profiles.php, you can read descriptions of the careers of mathematicians working in industry. These included a statistical analyst for the Boston Children’s Hospital, a data scientist for Staples Digital Solutions, a Global Strategy and Freight Trading Analyst for Philips 66, a senior director for operations research for Moody’s analytics, and many others.

Job Growth in Mathematics

According to the US Bureau of Labor Statistics, “Employment of mathematicians is projected to grow 21 percent from 2014 to 2024, much faster than the average for all occupations. Businesses will need mathematicians to analyze the increasing volume of digital and electronic data.”

Note that the average projected employment growth for all occupations between 2014 and 2024 is 6.5%.

If “math occupations” is interpreted more generally, the forecast is even better. The Bureau says “Employment of math occupations is projected to grow 28 percent from 2014 to 2024, which will result in about 42,900 new jobs. Growth is anticipated as businesses and government agencies continue to emphasize the use of big data, which math occupations can analyze. Math occupations had a median annual wage of $81,750 in May 2016, which was higher than the median annual wage for all occupations of $37,040.”

What have BYU Math Majors Done?

Some recent jobs that BYU graduates with a major in mathematics have received are:
- Technical Services, Epic Systems, Madison, WI
- Data Scientist, Apple, San Francisco, CA
- Quantitative Analyst, Magnetar Capital Associate Consultant, Bain and Company
- Business Analyst, Capital One Analyst, Goldman Sachs, Salt Lake City
- Systems Engineer, Raytheon Missile Systems, AZ

In addition, many BYU mathematics graduate students go on to graduate school in mathematics, economics, computer science, finance, or other fields, at universities such as BYU, Northwestern University, University of Texas at Austin, Cornell University, MIT, Duke University, Purdue, Boston, University, and others.