

# Undergraduate Research

## Department of Mathematics

### Brigham Young University

#### UR at BYU and the Math Department

BYU is committed to providing undergraduates opportunities to do research with research-active faculty: last year the Office of Research and Creative Activities (ORCA) funded 1/3 of nearly 960 student proposals to the tune of \$1800 each, a grand total of just over \$570K. But we in the math department like to think we are even more committed: last year we spent over \$600K on both local and outreach oriented undergraduate research, and we fund nearly every student who wants to work with us. What's more, at ten dollars per hour, a max of 20 hours per week, and around 24 fundable weeks in a two-semester year, a student working with us could earn \$2400 per year, all while greatly augmenting both their mathematical and university education. This leads us to...

#### How good is the Math Department?

*Stinking good!* We are nationally recognized for excellence in undergrad research. In the last 4 years we've won \$2,675,000 in competitive, national grants to do—and to teach others how to do—undergrad research. Our model is exported throughout the US via the *BYU Center for Undergraduate Research in Mathematics* (CURM). CURM brings non-BYU faculty to BYU and trains them to develop undergrad research programs back at their home institutions. Check out this credential at <http://curm.byu.edu/>. Other credentials include National Science Foundation (NSF) funding of our *BYU Summer Mathematics Research Experience for Undergraduates* (BYU Math REU), which brings undergraduates from other institutions to BYU for an eight-week immersion in discovering new mathematics. A few BYU students are accepted to this program every year, so check out the program at <http://www.math.byu.edu/reu/>.

Perhaps the most relevant “credential” for you should be our \$525K of NSF funding for the *Interdisciplinary Mentoring Program in Analysis, Computation, & Theory* (IMPACT). IMPACT is not about outreach—it's about mentoring *BYU* students to do research in nationally and even internationally acclaimed *BYU* research groups and laboratories. Getting accepted to this research program is hard—*your awarded a*

*\$10,000 fellowship!*<sup>1</sup>—but a summer of intensive training will prepare you for a year of researching in Science, Technology, Engineering, and Mathematics (STEM) fields, those that the STEM Coalition indicate are “vital to our nation's short- and long-term economic prosperity, global competitiveness and security.”<sup>2</sup> Receiving an IMPACT Fellowship is one of the most prestigious things that can happen to you while you're here. Visit <http://impact.byu.edu/>. More on this, the *BYU Math REU*, general Mathematics Department mentoring and ORCA below...

#### Why not wait till Graduate School?

*Because UR can develop impressive credentials to get in!* The Math department has a great track record sending its alumni who've participated in UR to faraway places like Stanford or Princeton. Even if you don't plan on going to graduate school, here are other reasons UR is a good idea:

- It provides opportunities to *apply* classroom knowledge and, so, motivate and retain it.
- *Mathematics* UR develops analytical approaches to problem solving, transferable even to LSAT-acing skills<sup>3</sup>.
- It may allow you to make more informed decisions about your ultimate career path.

For all these reasons and more our belief in the math department is that if you exit BYU without having performed undergraduate research, then we have dropped the ball in a very big way. Help us succeed in preparing you to compete with your peers:

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<sup>1</sup> “Less tax and license”—students may work up to 40 hours per week in the summer boot camp.

<sup>2</sup> February 10, 2009 letter from the STEM Education Coalition to House Speaker Nancy Pelosi

<sup>3</sup> “...this is a test you can't actually study for. ...the LSAT is not a test of knowledge.... [It] aims to test the level of logical and analytical skills that you've acquired throughout your education....”

<http://www.4lawschool.com/acingthelsat.htm>

## Finding a Research Mentor

Again, undergraduate research opportunities in the department of mathematics at BYU are among the finest in the nation. Several programs sponsored by the NSF have their home here, including CURM, the BYU Math REU, and the CSUMS/IMPACT program. But these programs were only made possible by the long list of mathematics faculty who've been independently dedicated to vibrant undergraduate research mentoring over the last decade and prior. Consequently,

### Department-Sponsored Research

The vast majority of undergraduates doing research in our department have gotten started by (the equivalent of) clicking on our undergraduate research page

[https://math.byu.edu/home/undergraduate/undergraduate\\_research\\_program](https://math.byu.edu/home/undergraduate/undergraduate_research_program)

and then selecting **Finding a Research Mentor**. There you'll find a long list of mathematics faculty willing to do research with you on the topics listed, modulo a few listed pre-requisites. You should contact the faculty of your choice and work out arrangements. Again, you can get paid \$10 per hour for up to 20 hours per week during a semester in which you are a BYU student. There are no deadlines here—you can get started when you're ready (which we believe you should expedite as much as possible).

### NSF Sponsored Research

Being able to put the three letters N-S-F on your resume will go a long way to opening important doors for you. There are two types of NSF-funded research at BYU, with varying availability:

#### BYU Math REU

Every year a small number (about 4 men and a somewhat higher number of women) of BYU students are accepted into the BYU Math REU. Aside from providing an intensive 8-week period of summer research, you will also attend seminars on how to get accepted to graduate school, how to succeed there, etc. Also you'll get a stipend of over \$3K, up to \$500 to travel here, and \$750 for travel to mathematics conferences to present your research. Some fraction of the \$3K stipend is contingent upon you completing a working paper for submission to a research journal. There is a deadline for applications,

which are made available by at least January 1 of the given year, and are due around March 1. Routinely visit

<http://www.math.byu.edu/reu/application.html>

for updates, or send mail once and for all to

[reu@math.byu.edu](mailto:reu@math.byu.edu).

Also the program management receives faxes at 801-422-0504. Again, putting "NSF REU" on your vitae is a big deal.

### BYU IMPACT

About 15 BYU students are admitted into this year-long program every year. It starts with a summer 7-week intensive boot camp course (complete with credit) and continues in the fall with your chosen assignment to a BYU research group or laboratory. Research performed during the fall and winter term must be reported in the annual BYU College of Physical and Mathematical Sciences Spring Research Conference, and then polished for journal publication in spring term. Applications appear somewhere at the website

<http://impact.byu.edu/>

by about January 1. Math 343 is a prerequisite. Contact the IMPACT Program Office, 311 TMCB, 801-422-3020 for more information. Again this is a highly competitive program, and admittees are encouraged to put "NSF IMPACT Fellow" on their vitas.

### BYU Sponsored Research

Another way to credential your undergraduate research (for reference on a resume) is to engage in the somewhat competitive ORCA grants. See

<http://orca.byu.edu/Students/ApplyNow.aspx>

**IMPORTANT:** the due date for 2009's round of grant proposal submissions is FRIDAY OCTOBER 30<sup>th</sup>. Students will be asked to indicate their mentoring faculty, who should be apprised of and agree to your plans to work with them, including signing off on your written proposal. (If you succeed past low-levels of review, the mentor will likely be contacted to write a recommendation for your proposal.) Students should consider listing an ORCA award on their resume.