Attracting and Retaining Math Majors

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The Problem

![Graph showing the number of math graduates in the US from 1966 to 1998. The graph indicates a peak in 1966 with 25,000 graduates, followed by a decline. Around 1974, there is a sharp decline to about 5,000 graduates. From 1982 to 1986, the number increases significantly, peaking again at around 25,000 graduates. Post-1986, the numbers decrease gradually, reaching 1998 with around 10,000 graduates. The graph highlights specific percentages: 4.6% in 1966, 1.2% in 1982, and 0.9% in 1998.]
NC State Data

Math Majors, NCSU

Year

Math/Honors Program Grads

Year

Math Grads

Honors Program Grads

22%

4%
What Changed?  
(in the Math Program)

• Key decisions in the middle 1980’s
  – Raised the admission requirements
  – Created a “bridge” class
• Gradual changes in other areas
  – Teaching
  – Advising
  – Extracurricular
Key Factors in Attracting and Retaining Math Majors

- Good teaching
  - Calculus & “bridge” classes (attracting)
  - Upper level required courses (retaining)
- Small classes
  - “bridge” class, upper level classes
- Good advising
  - Academic, including placement & Plan of Study
  - Career advising
- Flexible major
  - Math electives chosen to boost career choice
  - Makes a good second major
Other Factors

- Diverse faculty
- Math Competitions
- Math Club
AND!

Math Honors Program
Math Honors Program

• Founded in 1960’s to
  – Challenge our best students
  – Prepare them for graduate study or rewarding post-graduate work

• Some gains from 1980 - 1990

• Dramatic success in the past 12 - 14 years

What Changed?
Evolution of the NC State Honors Program

• 1980’s: figuring out how to identify, recruit and advise students

• 1990’s-present: an aggressive advising system that guides talented students to opportunities inside and outside the university

23 Graduates
4 Pursue Math PhDs
3 Pursue Other PhDs

108 Graduates
30 Math PhDs
29 Other PhDs

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Identification

• Choose your target
  (e.g. grad school-capable students)

• Identification classes
  – Look for strong performers in early proof-based classes
  – Talented or interested students need to take these classes ASAP

• Entering freshmen
  – Identify very advanced freshmen
  – Coordinate with Admissions
  – Advertise and make yourselves available!
Recruitment

Two things the students must hear

• “The Honors Program is exciting, challenging, and will open doors for you!”
  – Honors classes
  – Research
  – Summer Programs and Study Abroad
  – Post-graduate Opportunities

• “The Honors Program will work for you!”
  – Sit with the student and build a plan-of-study incorporating all of his/her educational goals
NC State’s Math Honors Program Requirements

- **Admission**
  - 3.5 GPA in math and overall
  - Recommendation of identification class professor
- **Graduation**
  - 2nd semester of analysis
  - Three graduate math courses
  - Research/Independent Study Project
- **Our students leave ready for grad school**
The Program’s Core: Advising

• Long-term personalized relationship
• Continuing monitoring and support
  – At least one serious conversation per term
• Covers all of undergraduate career and constantly presents opportunities
  – Academics, math and otherwise
  – Research, summer, and study abroad
• Includes post-graduate planning
  – Graduate school and fellowships
  – Jobs beyond math and academia
How do I Build an Honors Program?

• Identify enthusiastic faculty
• Select leadership
• Build a committee of advisors
• Establish
  – Faculty responsibilities
  – Student requirements
• Coordinate with university
Faculty Roles

Program Leadership
• Build Faculty Awareness
• Coordinate Advisors
• Find Opportunities
• University Liaison

Advisors
• Enthusiastic
• Recruit
• Guide
• Encourage

Everyone
• Identification
• Research Supervision
• Recommendation Letters

What’s the payoff?

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# Math Grad Schools

## 1980’s
- Berkeley
- Indiana
- Rutgers
- VPI

## 1990’s - present
- Princeton
- Berkeley
- Cambridge, UK
- Stanford
- NYU
- UCLA
- Wisconsin
- Cornell
- Maryland
- Rutgers
- Urbana-Champaign
- Penn
- UT Austin
- Northwestern
- Ohio State
- Duke
- Penn State
- UNC
- NC State
- Tennessee
NCSU students attending REUs, Budapest, etc. pursued PhDs at more prestigious schools.

No Special Programs

Princeton
Berkeley
Cambridge, UK
Stanford
NYU
UCLA
Wisconsin
Cornell
Maryland
Rutgers

14

Attending Special Programs

Urbana-Champaign
Penn
UT-Austin
U Washington
Northwestern
Ohio State
Duke
Penn State
UNC
NC State
Tennessee

7
6

*Data Since 1990

Your honors program can channel students to these opportunities!

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And that’s not all!

- 5 NSF’s for 2nd majors
- 3 DoD Fellowships
- 2 Gates Fellowships
- 1 Fulbright
- 1 Ford Fellowship
- 5 Goldwater Scholarships
Key Points

• Bright students are much more likely to reach their potential when
  – skillfully guided
  – presented with challenging opportunities
  – encouraged and supported

• Faculty efforts have maximum effect when strategically coordinated

• An Honors Program is a great way to achieve these goals
So How Does This Work for Your Department?

Overall Honors Program strategies of:

– Long-term personalized relationship
– Continuing monitoring and support
– Planning the undergraduate career and presenting opportunities
– Post-graduate planning

Can have a huge impact on every student and will grow your department