

# **Attracting and Retaining Physics Majors at Brigham Young University**

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# Brigham Young University

- Private school sponsored by the Church of Jesus Christ of Latter-Day Saints
- Enrollment capped at about 30,000 students
- Some enrollment pressure, but most students who apply get admitted
- Principally an undergraduate focus, with a relatively small but significant graduate program

# Majors, Fall 2003

- Undergraduate Students (304)
  - BS (160)
  - Applied, Selected Options (44)
  - Applied, Computer Science (18)
  - BA, Teaching (26)
  - Physics-Astronomy (56)
- Graduate Students (34—(3 not in residence))
  - MS (23+1)
  - PhD (8+2)

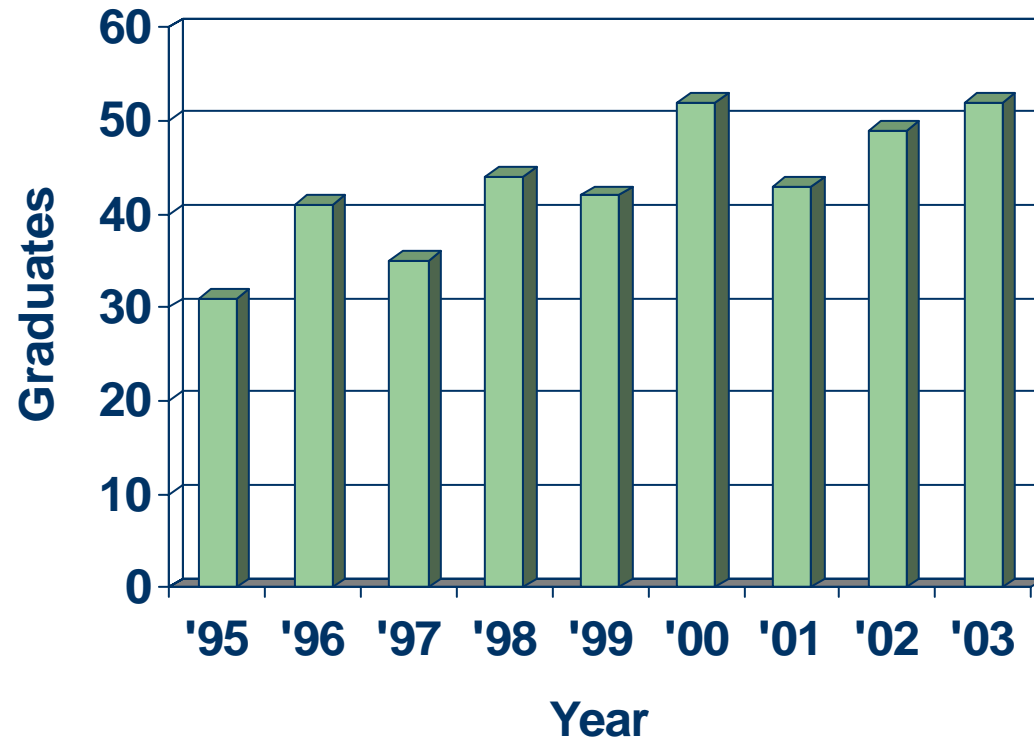
# Composition of Majors

- About 1/3 women (fraction is growing)
- Predominantly U.S.
- No ethnic data
  - ~5% Hispanic (WAESO involvement)
  - Occasional student from other groups

# Fall 2003 Enrollments

- **Introductory Physics**
  - Calculus (483/259/271)
  - Algebra (699)
- **General Education**
  - Physical Science (2329)
  - Astronomy (321)
  - Other (233)

# BYU Physics Graduates



# Attracting and Retaining Majors

- Orientation
- Advisement
- Promoting student-student interactions
- Faculty mentoring
- Undergraduate research
- Teaching emphasis
- Department culture

# Orientation and First Year

- Freshmen meeting with SPS Officers, Associate Chair, and U-grad Advisor
  - Introductions
  - Suggestions for Success
  - Undergraduate Handbook
- Required Introduction to Physics Class
- Majors-only Section



# Advisement

- Formal Advising
  - Class advisors
  - On-call advisors
  - College Advisement Center
  - Peer Advisors
- Informal Advising
  - Research Advisors
  - Other Students

# Promoting Student-Student Interactions

- Very Active SPS Chapter
  - Monthly meetings
  - Outreach
- Undergraduate Study Room
- Open Tutorial Labs
- Peer Instruction
- Undergraduate Research Groups

# Faculty Mentoring

- Undergraduate Research Experiences
  - Many start in first and second year
  - Students recruiting students
  - SPS Research night
- Inviting students to lunch
- Faculty accessibility
  - Office hours
  - Open door policy

# Undergraduate Research

- **Alumni Survey (1998):** 50% had done research with faculty, 78% said it was a good or excellent experience
- Currently required for all majors
- **Exit interviews:** a very challenging, but often defining undergraduate experience

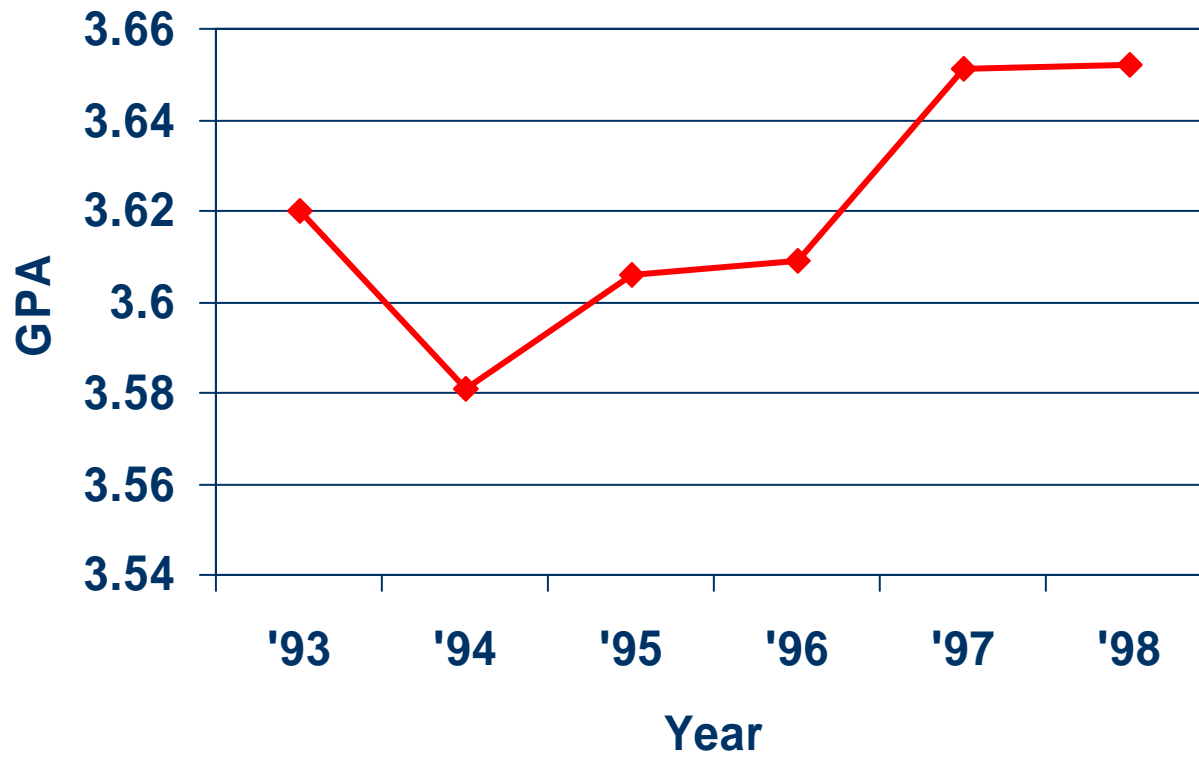
# Teaching Emphasis

- Evaluation
  - Annual interviews
  - Rank and status reviews
- Departmental Teaching Discussions
- Outstanding full-time faculty teach general education and service courses
- Student involvement as TA's

# Department Culture

- Student emphasis
- Collegiality
- Institutional ties
- Values
  - Teaching
  - Relationships
  - Excellence

# Preparation



# Alumni Survey—Recruiting

- Personal enrichment (91%)
- Reputation of faculty (29%)
- Reputation of program (36%)
- Interest in subject area (100%)
- Influence of family (39%)
- Influence of other students (13%)
- Influence of faculty members (20%)



# Surveys

- University Alumni Survey (1998, 42% response rate)
- Fall 2000 Undergraduate Survey
  - Response Rate: 136 (~64%)
  - Anonymous on web
  - Short, Mostly Free Response
- December 2003 Undergraduate Survey
  - Response Rate: 57 (~27% of email addresses)
  - Asked for ID
  - Longer, Multiple choice with possible free response

## When Students Chose Major

- Before college 53% 52%
- Freshman year 21% 18%
- Sophomore year 14% 23%
- Junior year 4% 4%
- Senior year 1% 4%

# Alumni Survey—Retention

- Positive
  - Demanding program/courses (~90%)
  - Learned a great deal (93%)
  - Academically Stimulating (83%)
  - Faculty/students relationships (~80%)
  - Overall satisfaction with major (85%)
- Negative
  - Advising (<30%)

# Why Students Chose Major

- Direct interest in subject (53)
- Understanding how things work (48)
- Indirect Interest
  - Math (23)
  - Other field(4)
  - Flexible/Broad major (17)
- Difficulty
  - Challenge/Intellectual Stimulation (22)
  - Aptitude (10)

# Choosing a Physics Major

- Disciplinary Characteristics
  - Fun(13)
  - Religious/Aesthetic Reasons (10)
  - Problem solving (9)
  - Hands-on (8)
  - Fundamental, logical, concrete, meaningful, creative surprises
- Financial
  - Career good (4)
  - Scholarship (1)

# Recruiting Influence of Others

- High School Course/Teacher (23)
- College Course
  - Introductory Course (14)
  - Caring Faculty (2)
- Family (6)

# Why Students Kept Major

- Continued interest in subject (69)
- Community: Professors (28), Students (11)
- Inertia/Perseverance (23)
- Challenge/Reward/Growth/Prestige (23)
- Research Experiences (10)
- Job/Career (8)
- Broad Subject, Options (7)
- Aptitude (6)
- Still fun (5)

# Other Reasons to Stay

- Predictable subject (“not art”)
- Like learning new things
- Organization of Department or Major
- Increased understanding
- Enjoy math or problem solving
- Family encouragement
- Want to help world or community
- Religious motivations
- Scholarship requirement



# Summary

- High school matters a lot
- Introductory college courses important also
- Challenging material is a plus for some
- Relationships are important
  - Faculty (research experiences help)
  - Students
- Students respond to subject interest more than career motivations