The Imes-Moore Fellows Program: A New Bridge Program at the University of Michigan Aimed to Enhance Diversity in Applied Physics

Çagliyan Kurdak
University of Michigan
Interdisciplinary Programs at UM

- The PhD program in Applied Physics
  - 25 years old
  - Graduated ~120 doctoral students
  - Has ~80 students
- The Imes-Moore Fellows Program
  - 2 years old
  - Has 7 students
  - Fully integrated with the doctoral program
- Marjorie Lee Brown Scholars Program in Applied and Interdisciplinary Mathematics
- Frontier’s Program in Ecology and Evolutionary Biology
Please check out our website to learn more about Applied Physics at the University of Michigan: http://applied.physics.lsa.umich.edu/

**Admissions process:** a completed application and transcripts of all previous academic records; Graduate Record Examination scores; personal statement; statement of purpose; three letters of recommendation with at least two of the letters from an academic institution.

Students will be admitted into the Imes-Moore Fellows Program based on their academic promise potential to benefit from a broad-based training program contribution to enhancing diversity of students in applied physics.

This last criterion will be assessed by the student’s background in one or more of the following areas: An educational, cultural, or geographical background that is underrepresented in applied physics Demonstrated commitment to fostering diversity Experience of financial hardship First generation U.S. citizen or first-generation college graduate

Applications will be processed for fall term admission.

* The deadline for applications is January 15.

You must apply online at: https://apply.embark.com/Grad/UMich/Rackham/ProgramA/33/

If you want to learn more about the Imes-Moore Fellows Program, please contact:

Charles Sutton (csutton@umich.edu) or Cynthia McNabb (cyndia@umich.edu)

Applied Physics Program
450 Church Street
1425 Randall Laboratory
The University of Michigan
Ann Arbor, MI 48109-1040
phone: 734-764-4595 or 734-936-0653
fax: 734-764-2193

A Master’s Program aimed to prepare students for doctoral research in interdisciplinary research in applied physics, physical sciences and engineering.
How Should a Graduate Program be Evaluated?

(1) Excellence in research

(2) Happiness of students

(3) Successful careers of our graduates
“The interdisciplinary program spans the Physical Science Division of the College of Literature Science and the Arts, the College of Engineering, Medical School, School of Public Health, School of Natural Resources and offers graduate studies leading to the Doctor of Philosophy (Ph.D.) degree in Applied Physics. Coursework and research are structured to meet individual goals so that the program is appropriate for students intending to pursue careers in research, industry, academia, or government service.”

Lots of bandwidth and research opportunities at UM, so FLEXIBILITY is key
Goals

- Ph.D. level training bridging science and technology
- Preparation for careers in:
  - industry
  - entrepreneurship
  - academia
  - national labs
- Facilitate interdisciplinary collaborations
Participating Departments

- Aerospace Engineering
- Atmospheric, Oceanic and Space Sciences
- Biomedical Engineering
- Chemistry
- Chemical Engineering
- Electrical Engineering/Computer Science
- Geosciences
- Internal Medicine
- Materials Science and Engineering
- Mechanical Engineering
- Nuclear Engineering and Radiological Sciences
- Physics
- School of Public Health
We have projects with a wide range of length and energy scales.
Research Scope

- Huge range of research projects:
  - photonics/laser physics
  - nanoscience and technology
  - quantum information
  - space physics
  - materials science
  - energy and environment
  - physics in the life sciences
  - microelectromechanical systems

- 110 faculty in 13 participating departments
Our Recipe for Success

(1) Flexibility

(2) Meeting the students where they are

(3) Mentorship

(4) Family structure
Flexibility in coursework choices

- Incoming students sometimes not well prepared for beginning graduate studies. May not have covered all the courses the program expects.
  - Students from varied backgrounds, including non-traditional students, returning to school after a prolonged period (in industry, armed forces personnel, family commitments, etc.) such students often need a semester or two extra time to get up to speed.
- Flexibility is needed! and (fellowship) funding needs to be available, hard to come by.
- Need to periodically review progress towards fulfilling the course requirements;
- **Entry interview** to identify any gaps in their undergraduate background and suggest corrective action.
- Oral Qualifying “Exam” as a **diagnostic** (usually one year after entry in the program). Very effective and efficient means to assess student preparation and identify gaps. Emphasize: **diagnostic** not “exam”
What (AP) students want...

Early entry into research.

- Supervised Research Semester (for credit) in second semester
- Join a research group of own choice.
- Provides early research experience and support structure among other grad students to “learn the ropes”
- No-strings way to try out a particular area, (and a potential advisor!)
  - 3 shots including pre-enrollment summer
  - Head start on grad program

Adequate financial support.

- Avoid overloading with too many teaching duties in first year.
  - Funding for fellowships/ RA in the first two years (expensive!)
  - External funds and fellowships,
  - Some internal fellowship support at UM
Need for effective mentoring

Early years of the graduate student experience in any program are very stressful:
- balancing difficult coursework with teaching duties
- transition from passive receptor, to active creator, of knowledge, is particularly difficult.
- demands of graduate studies must be met against the turbulent backdrop of personal relationships and family responsibilities.
- not all students are good at multitasking
- some students are unaware of their lack of preparation for graduate work until they find themselves falling behind in the first-year required courses.

- grad program must therefore be an ACTIVE PARTNER in the graduate education process
In what ways? -the Human Factors

- Build support structure in a large and sometimes uncaring bureaucracy
- program administration and staff dedicated to well-being and SUCCESS of students. MUST BE GOOD LISTENERS!
- conduit for addressing problems before they get to the point of damaging student morale and effectiveness.
- ensure each student is plugged into some support network, through a study group, a research group, making sure there are plenty of opportunities for the students to get together regularly.

- welcome receptions for incoming students,
- celebrations of achievements (academic awards, first papers published, best poster awards at conferences, etc.)
- the weekly pizza-lunch seminars
- informal receptions for faculty to meet the students.
- ......
Summary: best practices and lessons learned

- Key elements for success in a diverse graduate program include:
  - careful choice of program staff (dedicated and caring)
  - building a nurturing, supportive environment
  - identifying problems early and taking a proactive approach towards their solution
  - flexibility to allow for additional courses to fill gaps in preparation
  - adequate funding to support the first two years (subsequent years are usually supported by research grants in science and engineering)
  - early association with a study group or research group
  - continuous, ongoing mentorship of students throughout the Ph.D. dissertation process (peer mentors + faculty)
What is Needed to Start a New Program?

- Make sure your PhD Program is in a healthy state.
- Make sure there is strong support from the administration and key faculty in your unit.
- Must establish human connections to recruit students.
- Be willing to take risks.