Engineering Physics (EP) program at New Mexico State University

Our Mission

The mission of Engineering Physics at New Mexico State University is to offer an accredited degree that combines high-quality engineering and physics programs to best prepare our graduating students for careers in state-of-the-art industry or to move on to advanced study in engineering or physics.

Educational Objectives

EP Objective 1: Competitiveness. Graduates are competitive in internationally-recognized academic, government and industrial environments;

EP Objective 2: Adaptability. Graduates exhibit success in solving complex technical problems in a broad range of disciplines subject to quality engineering processes;

EP Objective 3: Teamwork and Leadership. Graduates have a proven ability to function as part of and/or lead interdisciplinary teams.

EPEAB Charge

- Review the current policies and procedures within the program and within the university administration in order to identify strengths and weaknesses.
- Identify issues within the program, the department and the university that directly affect the EP program and make recommendations for improvement.
- Identify potential opportunities and threats to future of the EP program.
- Evaluate whether the EP Program achieves its stated Program Educational Objectives.
- Prepare a report to be presented to the Engineering Physics Program Committee and for distribution to the deans.
- The 2016 EPEAB is also charged with two particular tasks:
  - review or suggest avenues to accommodate upcoming changes in the requirements for minimum credits (going from 128 to 120) , and
  - formulate expectations for the state-wide General Education as well as the university-specific Viewing the Wider World requirements.

EP Program History and ABET accreditation

- EP program was started in 2001, first students enrolled in Fall 2002
- started with **Electrical and Mechanical concentrations** in 2002
- first EP graduate in 2004
- ABET accredited in 2007
- added **Chemical and Aerospace concentrations** in 2009
- continued ABET accreditation granted in 2013
  - 2012 ABET review found no major weaknesses or deficiencies for EP.
  - A couple of minor concerns were listed (and they have been addressed).
- graduated 39 students to date; 5 more graduates are expected in Spring of 2014:
- The EP program has grown to 40+ students and still experiences continuous growth (at a rate of ~4 students per year since accreditation)

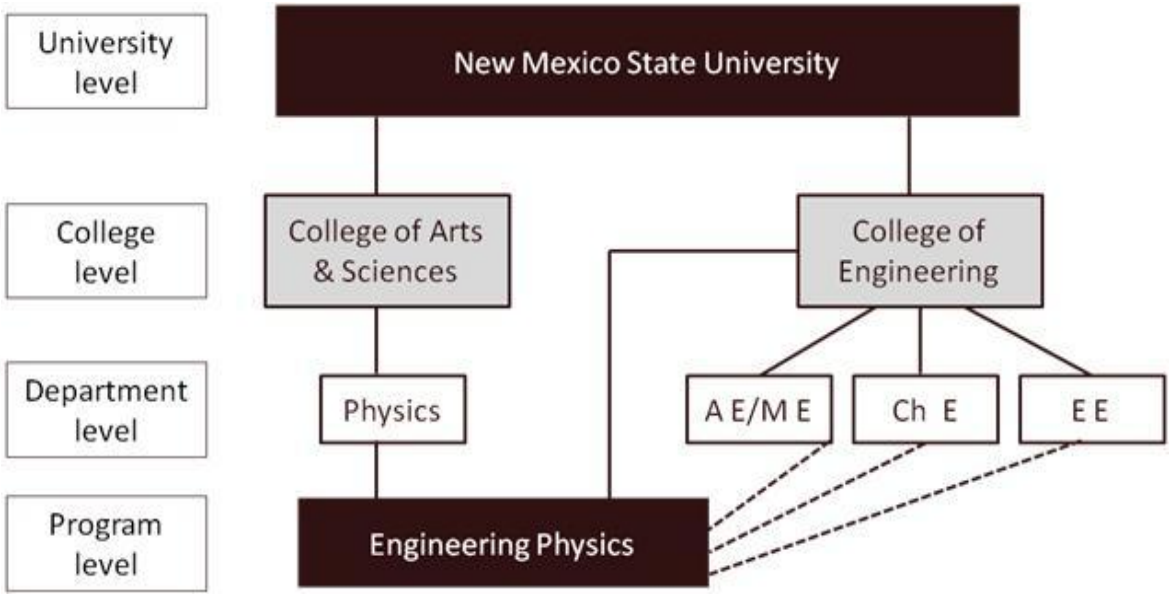
EP Organizational Flowchart & Program Coordination

Engineering Physics Program Committee

Heinz Nakotte, *Physics (Chair)*
Mike DeAntonio, *Physics*
Tom Hearn, *Physics*
Steve Pate, *Physics*
Igor Vasiliev, *Physics*
Young Ho Park, *ME/AE*
Steve Stochaj, *EE*
Hongmei Luo, *ChE*
Elena Fernandez, *DoP/LANL*

Stefan Zollner (*ex officio*)
DoP (Department Head)

Sonya Cooper (*ex officio*)
CoE (Associate Dean)



Engineering Physics is an engineering major in the College of Engineering, but it is administered by the Department of Physics, which belongs to the College of Arts & Sciences.

Recruiting/Retention Efforts

- **Outreach** to elementary, middle and high schools (Mi. Burkardt, SPS)
- **Physics Olympics** for high schools students (J. Urquidi)

- EP participates in CoE's **recruiting events**
- EP **Student Ambassadors**:
  - Luis Barrera (EP-ME major),
- **Recruiting letters** to prospective high-school graduates

Within the Department of Physics:

- **welcome lunch** for freshmen or transfer students to meet advisors & faculty
- each student has a **faculty advisor** to individually optimize course sequence
- **undergraduate research opportunities** (about 10 students are currently engaged)
- **employment opportunities** for students as learning assistants (LAs) computer support
- **travel support** for undergrad students to attends meetings and conferences
- Student societies can get support for pizza and refreshments for society meetings and **speaker series**.
- **social events**
  - Fall Barbeque Picnic
  - Spring Picnic

Student Societies

Society for Physics Students (SPS)

- revitalized/re-chartered in Fall of 2011
- has a dedicated meeting room (SPS room)
- organizes UG Speaker series showcasing UG research, workshops on applying for REUs, participates in a variety of events (Physics Olympics, HS outreach)

SPS president: Khadijih Mitchell; ***faculty mentors:*** Boris Kiefer, Michaela Burkardt

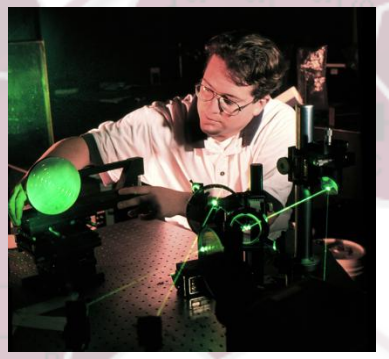
Society for Engineering Physics (SEPh) students

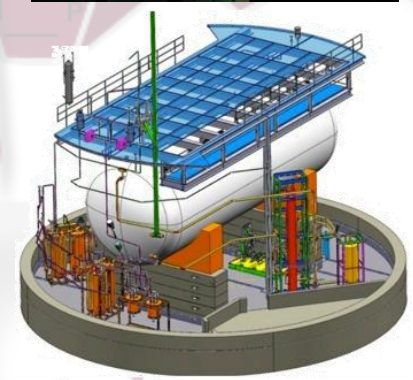
- initiated in 2010, paper work for formal recognition was submitted in 2012
- has a dedicated meeting room (Physics Computer room)
- organizes and participates in a variety of events (outreach, recruiting, social)

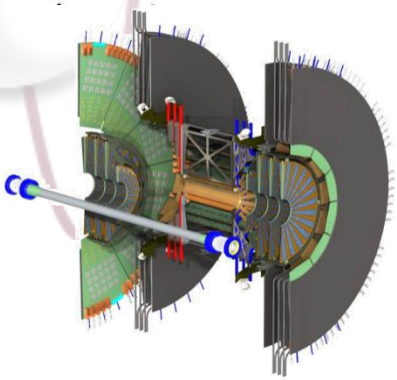
SEPh president: Luis Barrera; ***faculty mentors:*** Mike DeAntonio, Heinz Nakotte

Student Admission and Advising – EP Program

- **Admission** to the Engineering Physics undergraduate program
  - no program-specific entrance requirements beyond those of the university
- **Degree Evaluation**, Substitution/Waiver Requests and Transfer Checks
  - done in the Department of Physics
  - send for approval to the College of Engineering
- **EP curriculum** requires permanent attention
  - has to accommodate curriculum and course changes of involved departments
  - need to deal with (often unavoidable) scheduling conflicts and changes from one catalog year to another
- **St**udent **A**cademic **R**equirements (**STAR)** is the main degree audit tool
  - very useful, but requires frequent updates
- **EP Advisors:** Edwin Fohtung, Heinz Nakotte, Steve Pate, Tom Hearn
  - meet with students in person at the end of each semester about course scheduling, internship opportunities and/or plans
  - physics administrator may remove advising holds for all Physics and EP students







Opportunities for Undergraduate Research in the Department of Physics

Optics and Materials Science

DeAntonio, Fohtung, Kiefer, Nakotte, Urquidi, Vasiliev, Zollner, Luo (ChE, affiliate faculty), Sevostianov (AE/ME, affiliate faculty)

Particle and Nuclear Physics

Ma. Burkardt, Cooper, Engelhardt, Gibbs, Papavassiliou, Pate, Wang

Geophysics

Hearn, Ni (emeritus), new hire

Atmospheric Physics

Bruce (affiliate faculty), Goedecke (retired faculty)

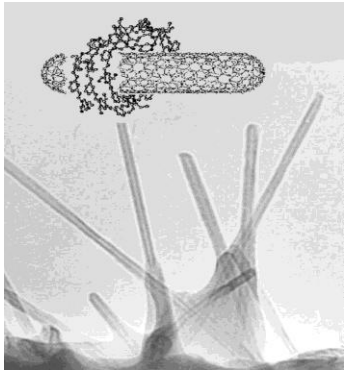
Cosmic Ray & Space Physics

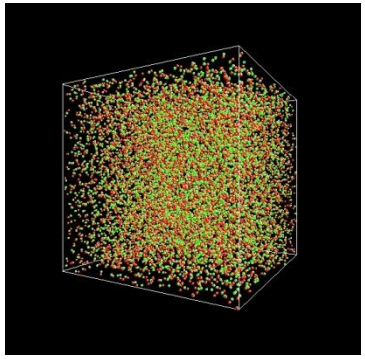
Higbie, Stochaj (EE, affiliate faculty)

Physics Education

Kanim (emeritus), DeAntonio, Mi. Burkardt

Good computing and/or laboratory skills required.

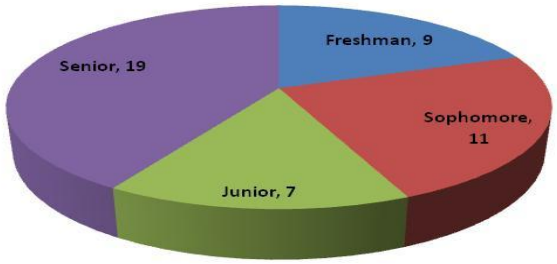




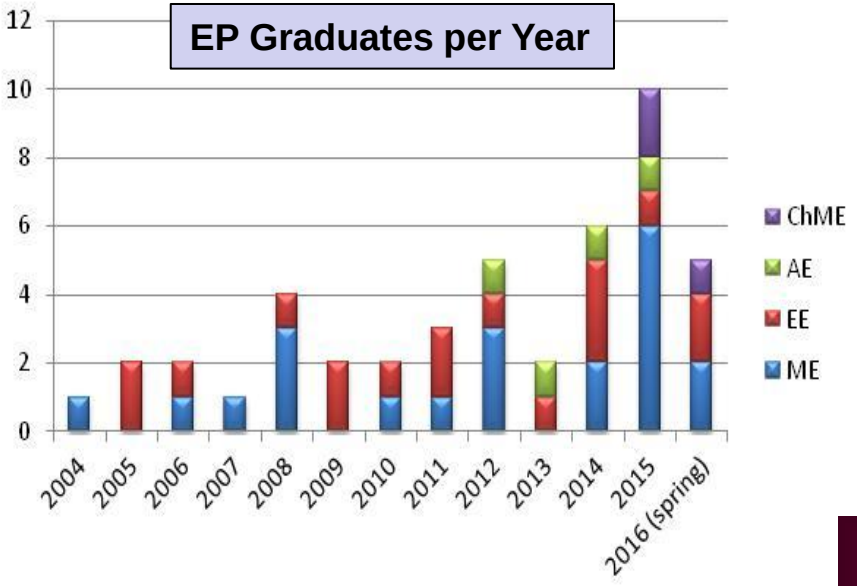
NM STATE UNIVERSITY

Enrollment Statistics and Graduation Rates

Classification of current EP Students



EP Graduates per Year



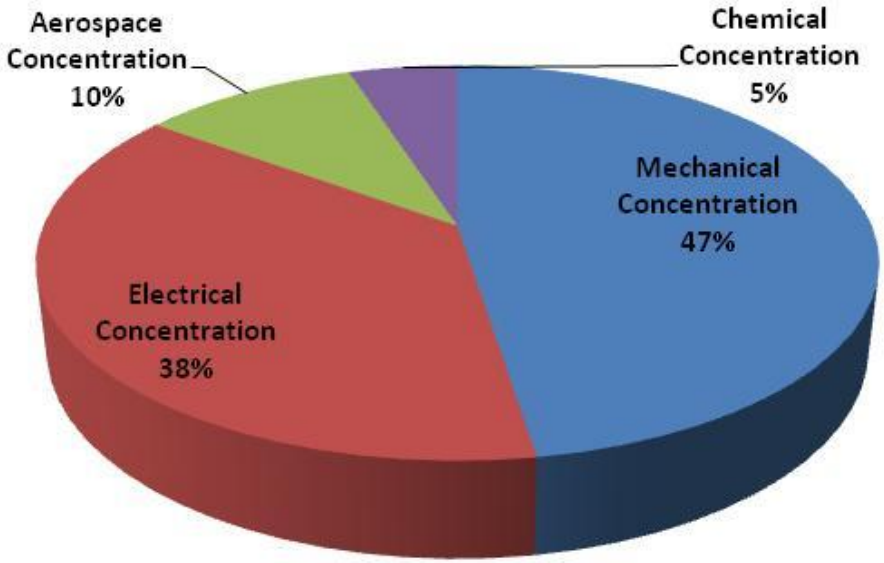
average: 168 credit hours!

Factors contributing to high credit hours:

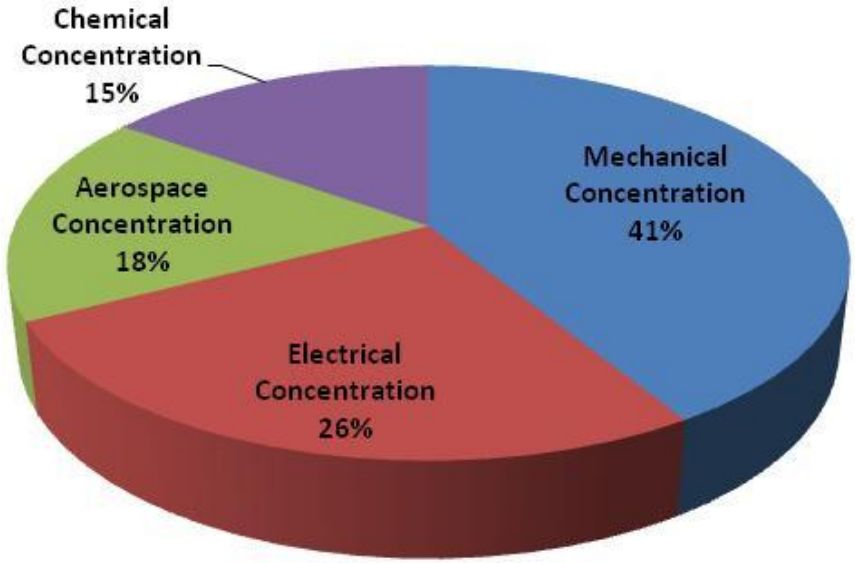
- insufficient math preparation
- additional minors
- double majors
- continued on grad programs at NMSU

EP Concentrations

Alumni



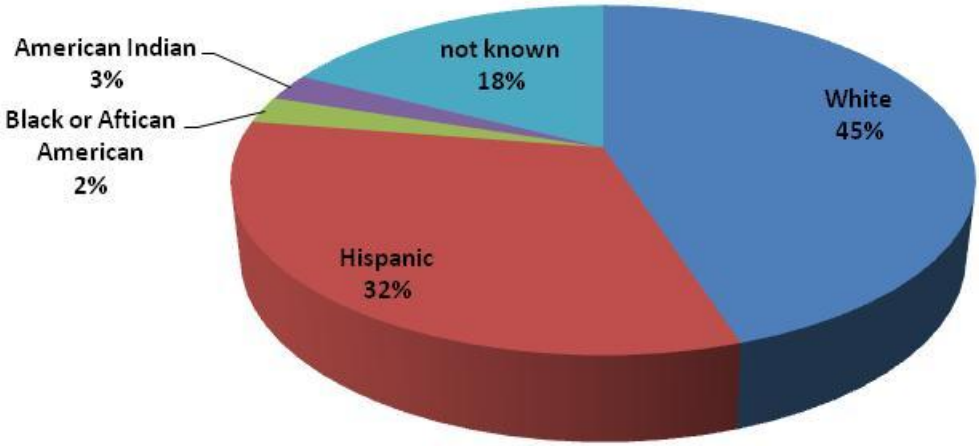
Current Students

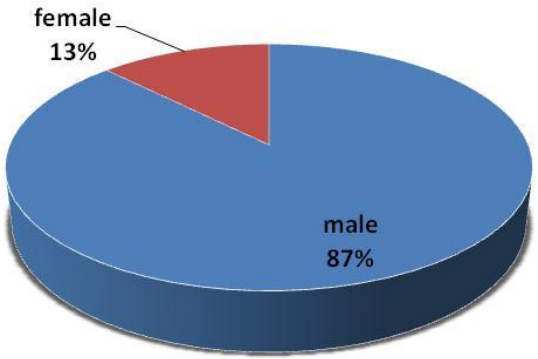


- ME concentration continues to be the strongest EP program.
- EE concentration experienced a slight decline.
- AE and ChME concentrations are gaining increasing popularity.

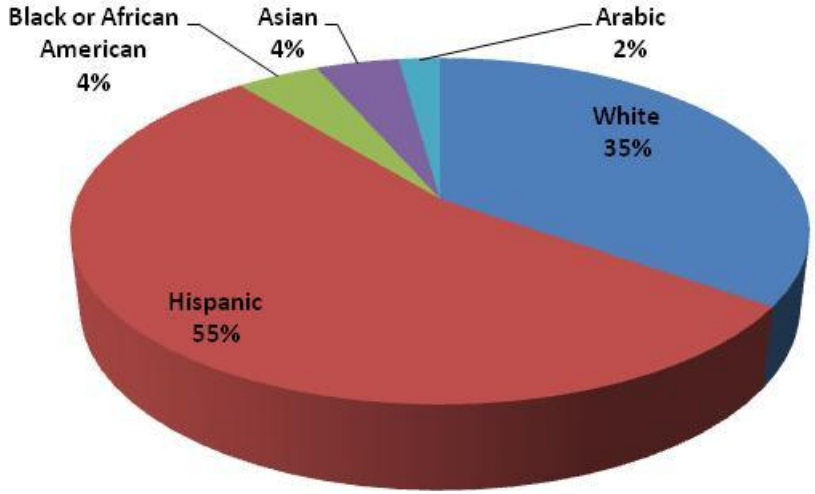
Diversity Statistics

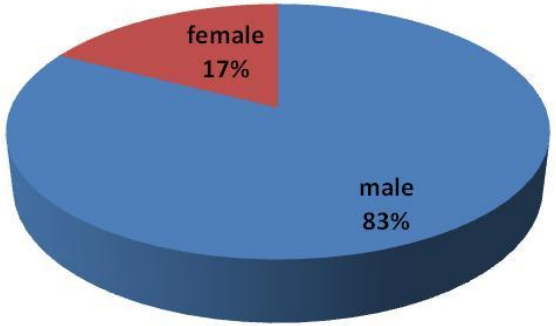
Alumni



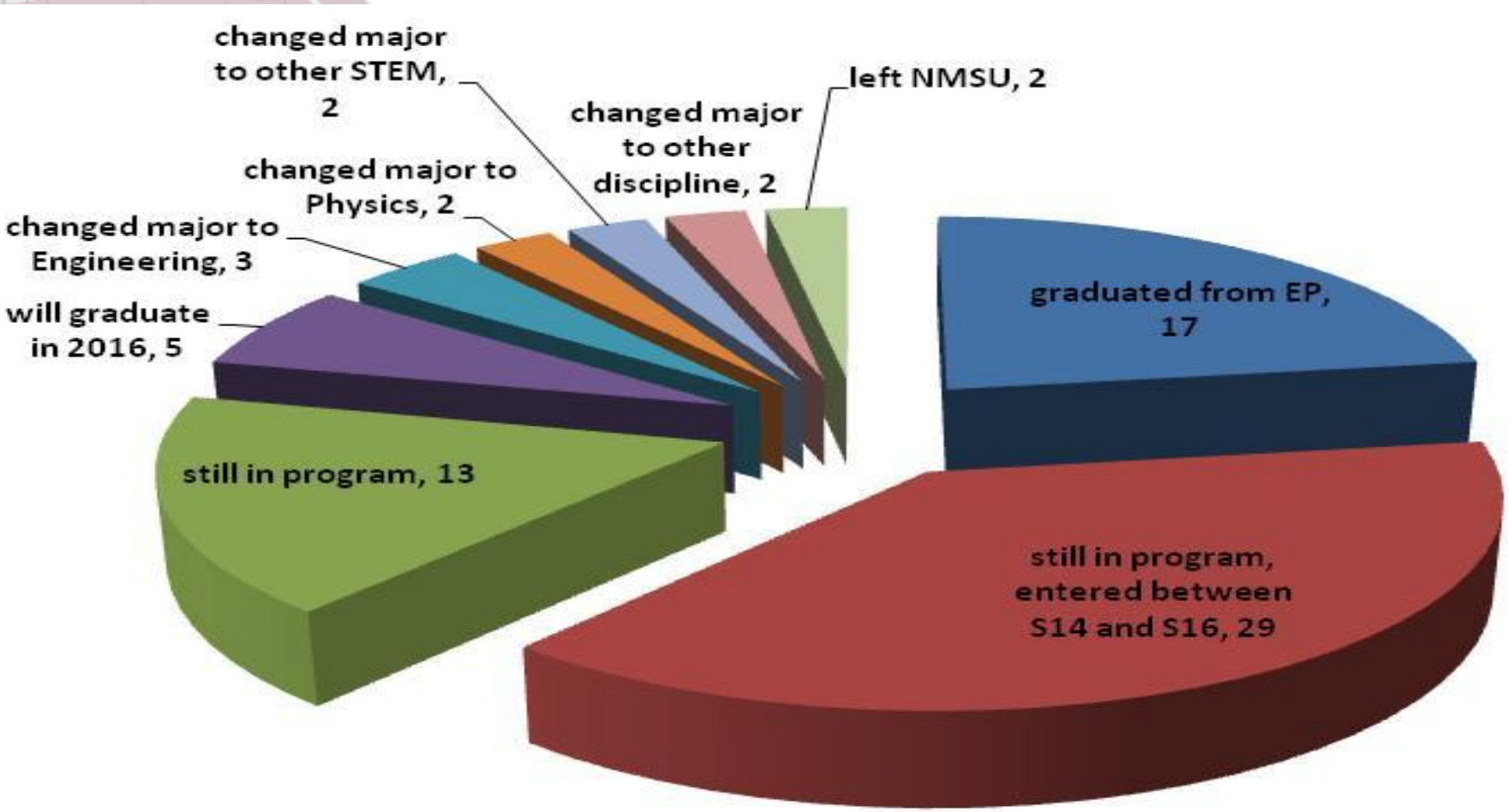


Current Students





Retention Statistics (Spring 2014 – Spring 2016)



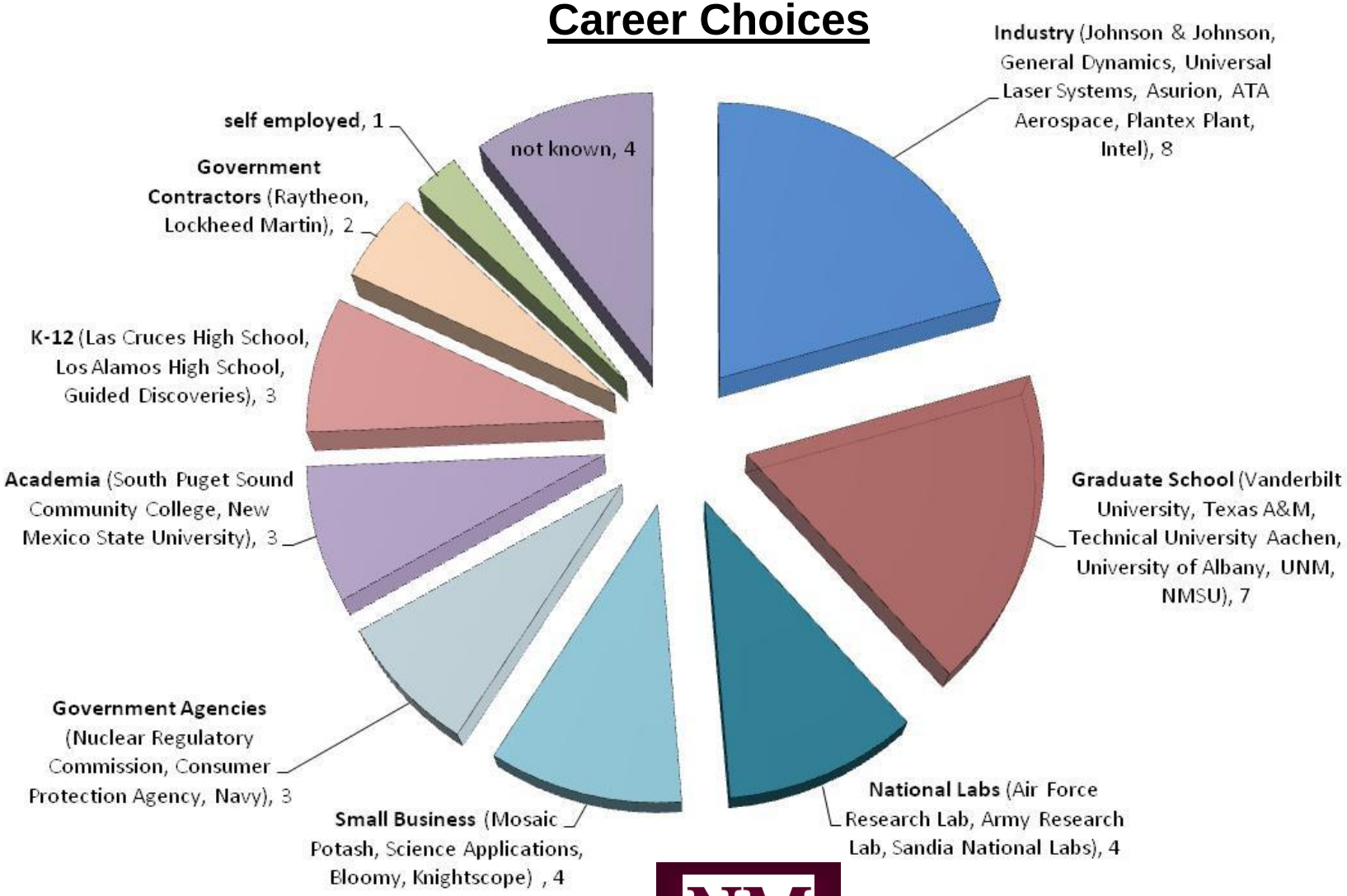
2016 Engineering Physics Graduate – Randy Andrews

In Spring of 2016, Randy Andrews will graduate as the Outstanding Graduating Senior for the whole College of Engineering. His major is in Engineering Physics – Mechanical Concentration and he completed a minor in Theatre Arts. Among others, Randy was very active in designing and building demo set-ups for the Department of Physics.

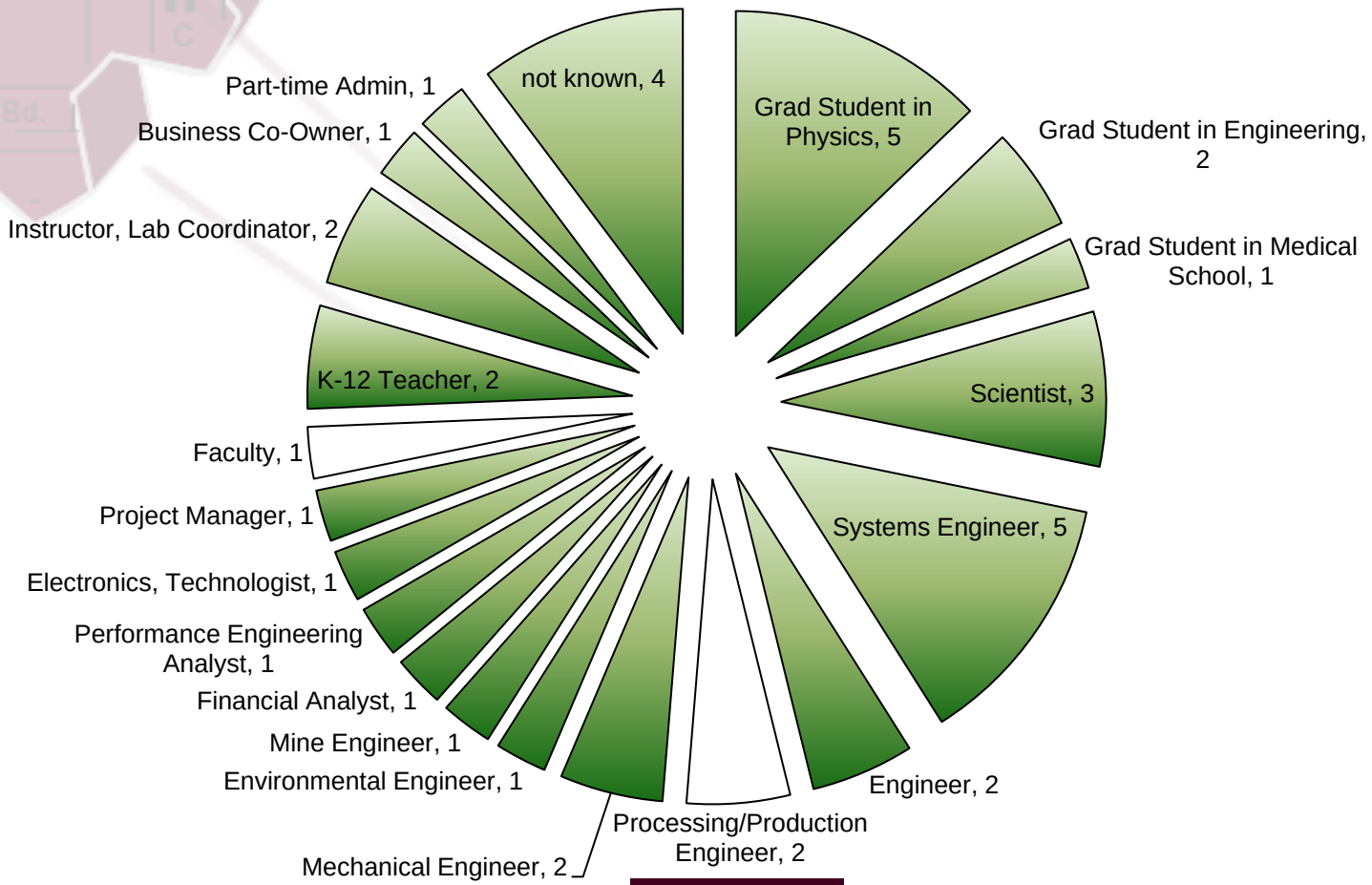
Capstone Project: Low-cost 'tiny house' project for homeless veterans.

Future Career: Randy was admitted as a graduate student into the Architecture program at UNM.

Career Choices



Current Job Titles of Alumns



Career Choices – An Example

Knightscope (the K5 beta prototype) is a fully autonomous moving robot that is intended for crime prevention.
It can be equipped with a wide range of onboard sensor arrays allowing for optical recognition, sound monitoring, thermal imaging and air-quality recording.
It will automatically alert enforcement agencies if certain limits are exceeded.

Clay Pottorff, our 2014 outstanding EP graduate, is a Production Engineer with Knightscope in Mountainview, California.

EP Program Challenges

- **Curriculum Issues**
  - strong push to go to 120 credits
  - GenEd/VWW requirements
- **NMSU Budget Woes at University**
  - admin support / replacement
  - anticipated program cuts
  - program costs
  - preparation for 2018 ABET
- **External Support**
  - EP Scholarship: Endowment contributions from alumni
  - External Funding Opportunities (NSF S-STEM)
  - Industrial or National Lab Support