

UMC Meeting Agenda
St. Botolph Club, 199 Commonwealth Avenue
Boston, Monday, Dec. 1, 2003, noon - 3:00 PM

1. Welcome, self-introductions, UMC membership - Slade Cargill
2. Feedback on preliminary UMC Survey results - Bob Snyder
3. Recruiting undergraduates for materials programs - best practices, comparisons with other engineering enrollment trends - Mufit Akinc and others
4. ABET
 - second round EC2000 experiences, impacts on materials programs, best practices - Gary Messing
 - proposed changes to General Criteria - Slade Cargill
 - initiatives for ABET applied science accreditation - Kirk Kolenbrander
5. Graduate student issues - Alex King
 - INS, visas, delays, etc.
 - Minimum stipends
 - Graduate recruiting and enrollments
6. MIT's new undergraduate materials curriculum and labs - Subra Suresh
(also opportunity for lab visits at MIT after the UMC meeting)
7. Need for coherent voice for materials community . . .
 - What does the Academic Community Need from Professional Societies?
 - Report from Materials Forum Meeting at CMU - Gary Messing
 - NMAB activities - Alex King
 - FMS activities - Aris Christou (not present)
 - Cooperative activities among materials societies
8. Plans for UMC-planned session on "Changing Undergraduate and Graduate Curricula" at the FMS Biennial Conference on "Materials Education the 21st Century Workforce," May 24-25, 2004, National Academies, Washington, DC | AND Plans for next UMC meeting - tentatively Tuesday afternoon, May 25, 2004, Washington, DC, following FMS Biennial Conference, - Slade Cargill

UMC Current Membership and Officers

64 institutions have paid dues this year

UMC meeting attendance:

	Spring (Washington)	Fall (MRS or TMS)
2003	17	today (Boston)
2002	27	23 (Boston)
2001	29	29 (Indianapolis)

Chair 2003-2004

Slade Cargill
Dept. of Materials Science and Engineering
Lehigh University

Vice-Chairs

Alan Cramb (Chair 2004-2005)
Dept. of Materials Science and Engineering
Carnegie Mellon University

Gary L. Messing (Chair 2005-2006)
Pennsylvania State University
Dept of Material Science and Engineering

Executive Committee

2002-2004
Mufit Akinc
Dept. of Materials Science and Engineering
Iowa State University

2003-2005
Alex King
School of Matls. Engr.
Purdue Univ

**Past Chair
(ex-officio)**
Robert L. Snyder
School of Materials Science and Engineering
Georgia Institute of Technology

12-01-03 UMC Minutes

Agenda item #1. Slade Cargill (Chair of UMC) reported that there were 29 attendees at the meeting (see list at the end) and 64 paid members of UMC.

Agenda item #2 Bob Snyder gave a preliminary presentation on the results from the 2003 UMC Survey. He requested assistance in reviewing the presentation format, etc. An ad hoc committee of M. Akinc, K. Jones and J. Morrell volunteered to assist. A complete survey will be sent out early 2004.



UMC Benchmark Data (Fall 2003)

Compiled by

Robert L. Snyder

School of Materials Science and Engineering
Georgia Institute of Technology

E-mail: bob.snyder@mse.gatech.edu

Presented at the Fall UMC Meeting
December 1, 2003

UMC 2003 Benchmark Data

Institutions Participating in Survey

Colorado School of Mines	North Carolina State University
Carnegie Mellon University	University of Pittsburgh
University of Virginia	University of Missouri -Rolla
The University of Texas Austin	University of Wisconsin Madison
University of California, Los Angeles	Rutgers, The state university of New Jersey
The Ohio State University	University of Delaware
University of Arizona	Virginia Polytechnic Institute and State University
California Polytechnic Institute	Case Western Reserve University
Purdue University	University of Michigan
The University of British Columbia	University of Illinois
Penn State	Massachusetts Institute of Technology
Northwestern University	Iowa State University
Winona State University	University of Washington
Auburn University	University of Florida
John Hopkins University	New York State College of Ceramics @ Alfred University
Lehigh University	Michigan State University
	Georgia Institute of Technology

Agenda item #3
Presentation by Mufit Akinc on
undergraduate MSE student
recruiting at Iowa State (ISU)

It's a Materials World!

Akinc

Activities

- **Materials Demos**
 - Hands-on, interactive, fun
- **Events on Campus**
 - Scholars' Day, Minority Preview Day
 - PWSE "Road Less Traveled"
 - Destination Day, Legacy Day, Science Bound, Iowa Science Center, etc.
- **HS Women Summer Research Interns**
- **Open House for Undeclared Freshmen**
 - Follow up!

Internet Explorers



- Industrially Supported
- Web pages on engineering topics at 6th grade level
- 7 years, 96 interns, half minority, >90% in SMET majors, 10 in MSE at ISU

Recruiting Tips

Top 10 list

1. Make **Materials** a recognizable term for K-12
2. Focus on best, women & minority students
3. Stress the hands-on excitement of curriculum
4. Stress the quality of instruction
5. Stress personal attention
6. Offer participation in research projects
7. Offer tour of the facilities
8. Offer personal time with faculty
9. Offer Scholarships
10. Talk about jobs: type, salary, flexibility

Motivate faculty

- Future of MSE depends on it
- Listed in *Performance Objectives*
- Fun to teach **larger** class & **better** students
- Feeds the research
 - ugrad research helper, graduate recruitment
- Offer reward, and **MEAN IT!**
- Set example: make yourself available

Results

- Enrollment: from 67 to >160
- Women: from 15% to 35%
- Minority: from 5 % to 10 %
- ~1/2 Honors Program students
- 12 National Merit Scholars
- Highest starting salaries in the college

This has been a team effort

Special thanks to Profs. [Larry Genalo](#) and [Kristen Constant](#)

Undergraduate MS&E Enrollment Trends and Recruiting at Lehigh University

UMC Meeting
December 1, 2003
Boston, MA

Slade Cargill

Recruiting Students for Undergraduate Materials Programs

Problem:

Most high school seniors and college freshmen do not know about “materials” as a field of study or as a profession

Possible Solutions:

Outreach to middle schools and high schools

Materials “camps” (ASM Intern.) for high school students

Visiting days for high school students and their parents

Teaching K-12 teachers about “materials”

Early, continuing contacts with college freshmen

Importance of “common freshman year”

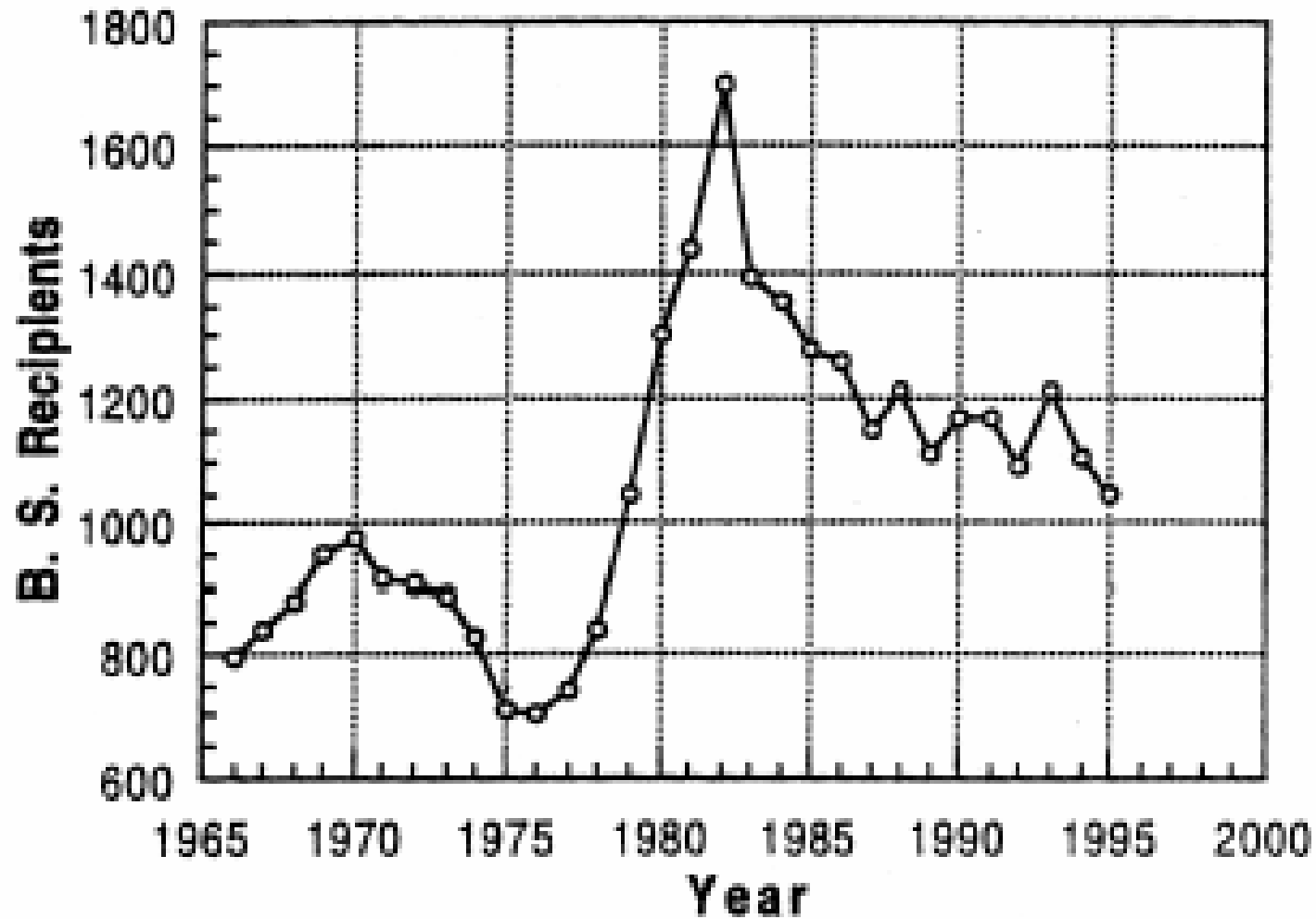
Materials faculty teaching freshman courses:

Intro. to Engr., Mat. Chem., . . .

Exciting curriculum, excellent teaching and advising,
research opportunities, internships, . . .

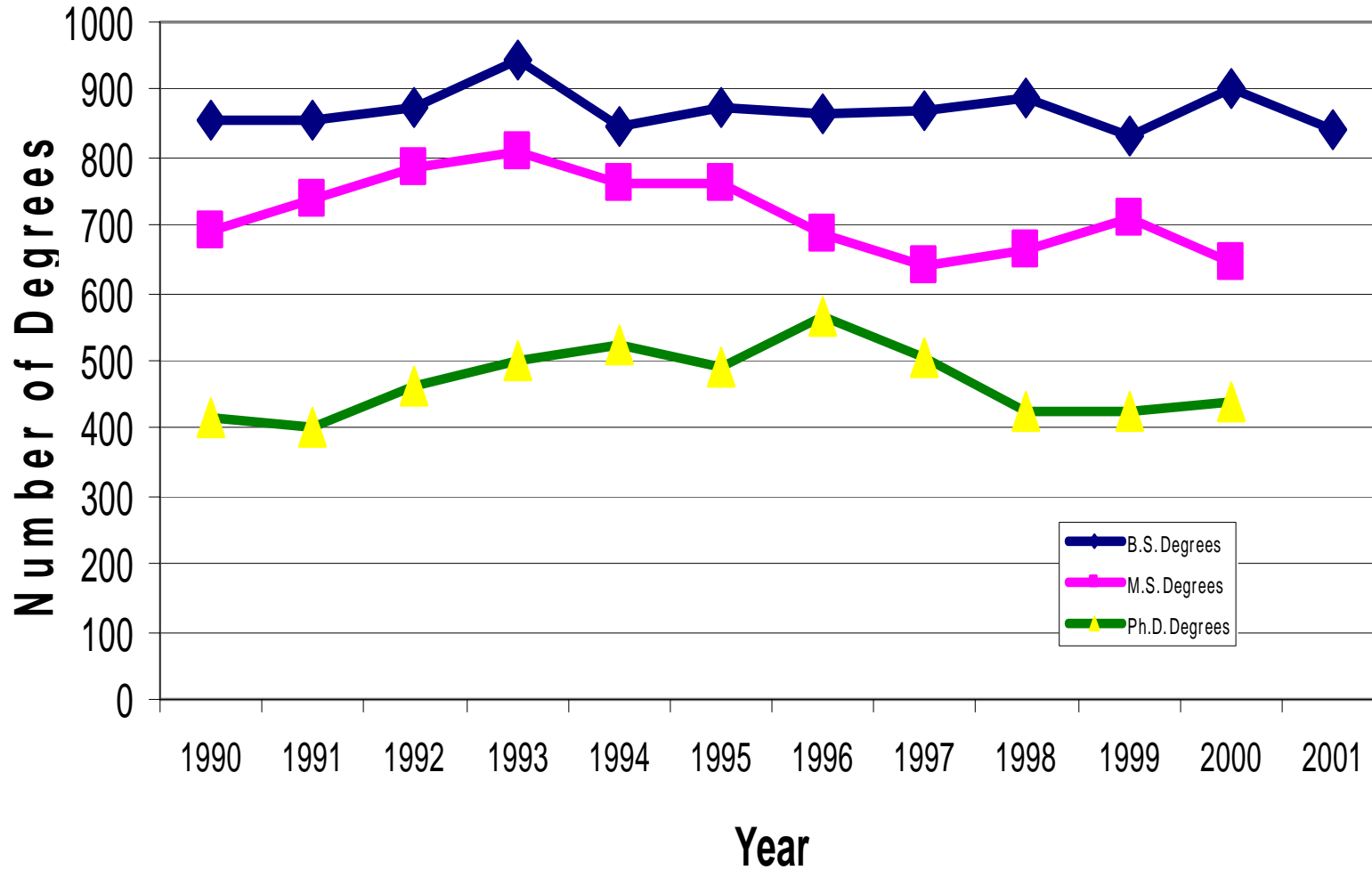
U.S. BS Degrees in Metallurgy and Materials

(Flemings and Cahn, 2000)



Materials Degrees per Year

(R. Abbaschian, NMAB, 2002)



Cargill

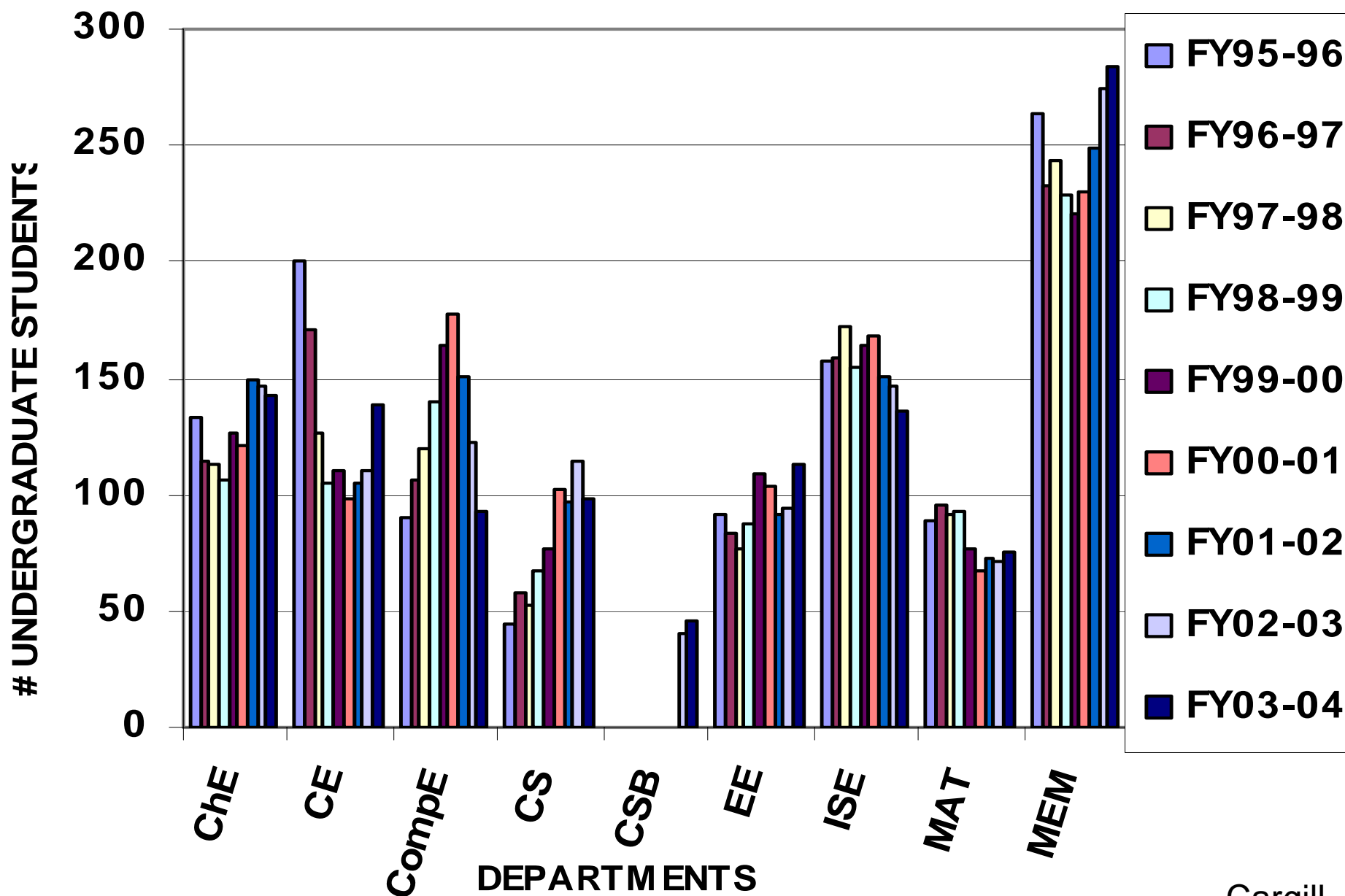
The Top Twelve U.S. Producers of Materials-Related BS Degrees in 2002

Institution	Degrees	Program Title
Clemson University	37	Ceramic Engineering
University of Illinois U-C	34	MS&E
MIT	31	MS&E
Cal. Poly. San Luis Obispo	30	Materials Engineering
University of Florida	30	MS&E
Univ. Missouri Rolla	29	Metallurgical Engr.
University of Washington	29	MS&E
Penn. State University	29	MS&E
Colorado School of Mines	27	Metall. & Mat. Engr.
University of Michigan	27	MS&E
Rutgers University	27	Ceramic Engineering
Michigan Tech. University	26	MS&E

Matls. BS Degrees as Percent of All Engineering BS Degrees ('00 or '01)

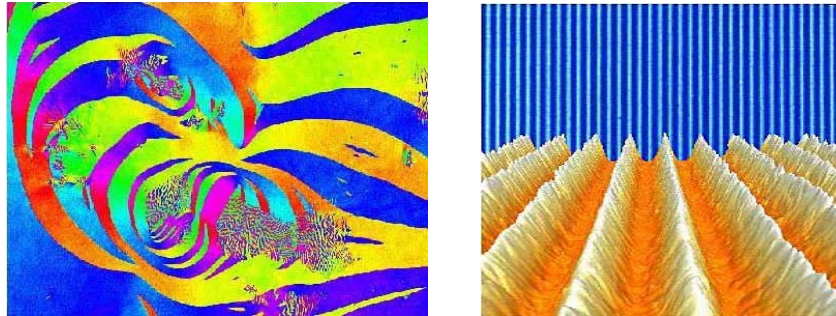
	Engr. BS Degrees	Matls. BS Degrees	Percent
Rutgers University	376	31	8.2%
Carnegie Mellon University	302	22	7.3%
Colorado School of Mines	490	34	6.9%
Lehigh University	324	22	6.8%
University of Cincinnati	260	17	6.5%
University of Washington	572	33	5.8%
University of Florida	762	42	5.5%
Northwestern University	364	19	5.2%
Cal. Polytechnic State University	747	38	5.1%
University of California at Davis	489	24	4.9%
University of Idaho	133	6	4.5%
University of Missouri-Rolla	562	25	4.4%
Massachusetts Institute Technology	660	27	4.1%
Michigan Technological University	724	30	4.1%
Univ. of Illinois at Urbana-Champaign	1136	43	3.8%
Ohio State University	690	25	3.6%
University of Pennsylvania	336	12	3.6%
University Of California, Berkeley	899	22	2.4%
Pennsylvania State University	1370	32	2.3%
Virginia Polytech. Inst. and State Univ.	961	20	2.1%
University of Michigan	1183	23	1.9%
Auburn University	554	6	1.8%
North Carolina State University	961	15	1.6%
Purdue University	1074	17	1.6%
University of California, Los Angeles	387	6	1.5%
Iowa State University	968	13	1.3%
Georgia Institute of Technology	1243	15	1.2%
Totals	18,527	609	4.0%

Engineering Undergraduate Enrollments at Lehigh University '95-'04



Welcome to Lehigh !
Have you decided what you'll be studying for the next four years ?

Whether you are a prospective engineer or arts major, you use many different materials in your daily life. Still, these pictures are probably unfamiliar to you -



(Images from NIST Electron Physics Group Nanostructure Collection)

They show aspects of two different advanced materials: domains in an amorphous magnet and nanoscale metal lines on a silicon surface. How are these materials being used to improve everyday life? How were the images made? Find out by learning more about Materials Science and Engineering! You've probably heard of electrical, mechanical, civil, and chemical engineering, but

Materials Science and Engineering

may be new to you. It is an undergraduate major in the School of Engineering and Applied Science in which students learn *hands-on* about developing new materials for advancing technology: to drive the next generation space vehicles, to improve athletic equipment, to make faster computers, to repair broken bones, and to produce safer cars, just to name a few of our goals.

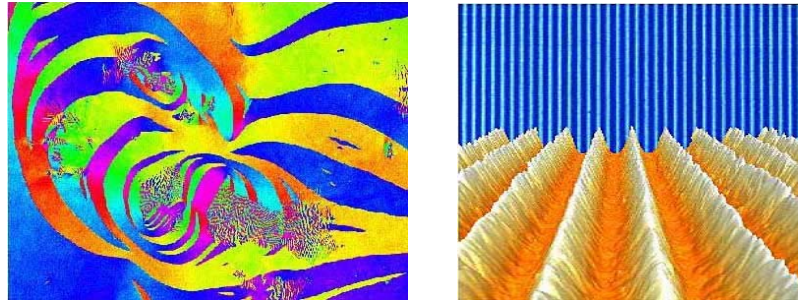
Curious? To learn more about opportunities in **Materials Science and Engineering** at Lehigh, see the department's website

<http://www.Lehigh.EDU/~inmatsci/major.html>

or *email Ms. Janie Carlin (jacq@lehigh.edu)* for a brochure about MS&E Careers and Lehigh's program. Drop by the Department Office, 370 Whitaker Lab. Look over the displays and posters about Materials Science and Engineering throughout Whitaker Lab. We can also put you in touch with current MS&E undergraduate majors who can tell you why they chose this major. Finally, to learn more about the many job opportunities available to materials professionals, check out the MS&E Career Resource Center on the web at <http://www.crc4mse.drg/>.

Have you decided what you'll be studying for the next three years ?
April 7-8 is the time to choose MS&E as your engineering major !

You use many different materials in your daily life. Still, these pictures are probably unfamiliar to you -



(Images from NIST Electron Physics Group Nanostructure Collection)

They show aspects of two different advanced materials: domains in an amorphous magnet and nanoscale metal lines on a silicon surface. How are these materials being used to improve everyday life? How are the materials made? How are the images obtained? Find out in Materials Science and Engineering. You've probably heard of electrical, mechanical, civil, and chemical engineering, but you may know much less about

Materials Science and Engineering

Students in Materials Science and Engineering learn *hands-on* about developing new materials for advancing technology: to drive the next generation space vehicles, to improve athletic equipment, to make faster computers, to repair broken bones, and to produce safer cars, just to name a few of our goals. Our B.S. graduates work for major corporations, local companies, or government labs, or go on to graduate school in engineering, business, law, or education.

To learn more about opportunities in **Materials Science and Engineering** at Lehigh, see our website <http://www.Lehigh.EDU/~inmatsci/major.html>, drop in to see our department chair, Slade Cargill, or associate chair, Alwyn Eades, in 370 Whitaker Lab, or talk with other faculty or students in MS&E.

Look over the displays and posters about Materials throughout Whitaker Lab and in the Packard Lab lobby. We can also put you in touch with current MS&E undergraduate majors who can tell you why they chose this major -- small classes, hands-on labs, lots of social events. Finally, to learn more about the many job opportunities available to materials professionals, check out the MS&E Career Resource Center on the web at <http://www.crc4mse.org/>.

Register as a Materials Science and Engineering major in 367 Packard Laboratory on Monday or Tuesday, April 7 - 8, at 4:10 p.m.

Cargill

Freshmen entering Materials Science and Engineering . . .

Welcome to MS&E! Here are TWO invitations to you for THURSDAY, APRIL 24 --

Join us for **pizza lunch** at NOON, in the MS&E Student Lounge, 349 Whitaker Lab. This is a chance for most of you to meet your faculty advisors and to meet faculty who will be teaching the MS&E courses you will be taking in Fall term. Also we will have "**MS&E Class of 2006**" T-shirts for you, and we will be taking snapshots for our Class of 2006 photo collection.

Please join us later on Thursday afternoon, for the annual **Spring Student-Faculty Picnic**, sponsored by the Student Materials Society, at 4:30 P.M. on the plaza between the front and back parts of Whitaker Lab. This year you will be a guest of the Department, but next year you will have to pay your own way, and help with the work! This is a chance to meet other MS&E undergraduates, faculty, and staff members, as well as have dinner.

Please confirm by email to Arnita Copeland (ACL8), or simply by replying to this email, to let her know whether you will be able to come to the pizza lunch and to the picnic.

I do hope that you will be able to come. I look forward to meeting all of you.

Regards,

Slade Cargill
Professor and Department Chair
Materials Science and Engineering

Cargill

Freshmen Entering Materials Science and Engineering -- Class of 2006

Welcome! We are very glad you have decided to major in MS&E. You will find that we are much more than just classes -- like picnics, coffee time, and friendships with other students, faculty and staff.

Please take a few minutes to let us know why you decided to major in MS&E by answering the following questions:

How important were the following factors in your deciding on MS&E?

1. What you knew about MS&E before coming to Lehigh.....Very 1 / **Some 10/ None 9**
2. **What you learned about MS&E in the MS&E lecture in Engr 2...Very 10/ Some 7/ None 1**
3. **Your visit to the MS&E department as part of Engr 2.....Very 11/ Some 2/ None 5**
4. **Information you received from other MS&E undergraduates.....Very 7/ Some 9/ None 4**
5. Information you received from MS&E graduate students.....Very 2/ Some 6/ **None 12**
6. Did you take Engineering 95? Y 10 or N 10 ? Fall term? _____ or Spring term? _____

If yes

- What you learned in the MS&E lecture in Engr 95.....**Very 7/** Some 2/ None 1

By doing an Engr 95 projects in MS&E.....**Very 7/** Some 0/ None 3

By hearing about one of the MS&E Engr 95 projects.....Very 1/ **Some 8/** None 1

7. Did you take Mat 33? Y or N ?

If yes

What you learned about MS&E in Mat 33.....Very / Some / None?

8. Other factors? Info in Lehigh Catalog? MS&E web pages? MS&E mailings?

Other factors? Lehigh Catalog? MS&E web pages MS&E mailings?

It looked like fun.

Course **Catalog** helpful, speaking with other undergraduates in the program.

Course **Catalog** was helpful in demonstrating what the classes involve.

MSE undergrads helped the most.

Candidates Day visit to the department last April.

Work Study.

MS&E **web page** was a big help.

MSE **mailing**, Lehigh **Catalog** somewhat, **web page** very helpful.

Courses in the catalog looked interested, sounded more interesting than other majors.

My advisor was from MS&E.

Mailings.

Info. in the **catalog** helped.

My uncle was a MS&E major, and he also helped convince me.

Seemed like a very flexible major, and that I would enjoy it.

What's Distinctive about Undergraduate Materials Science and Engineering at Lehigh?

1. Hands-on learning to forge links between theory and practice and to develop new and improved materials for advancing technology
2. Close student-faculty interactions, with only 25 - 30 undergrads per year and 14 full time faculty - small classes, intensive labs, lots of social events
3. Broad scope of materials applications - nanotechnology, electronics, photonics, automotive, sports, aerospace, medicine, energy . . .
4. World-wide reputation in materials characterization - undergraduates use electron microscopes and other state-of-art instruments in labs and in projects
5. Strong interdisciplinary links to other departments, universities, companies, and national labs provide opportunities for technical minors, joint degrees, student projects, internships, and jobs

Recruiting Students for Undergraduate Materials Programs

Problem:

Most high school seniors and college freshmen do not know about “materials” as a field of study or as a profession

Possible Solutions:

Outreach to middle schools and high schools

Materials “camps” (ASM Intern.) for high school students

Visiting days for high school students and their parents

Teaching K-12 teachers about “materials”

Early contacts with college freshmen

Importance of “common freshman year”

Materials faculty teaching freshman courses:

Intro. to Engr., Mat. Chem., . . .

Exciting curriculum, excellent teaching and advising,
research opportunities, internships, . . .

Other experiences about undergraduate recruiting

Bob Snyder – emphasis on nano and bio has had a positive impact

Alex King – Freshman engineering class is fertile ground for recruiting. Engage current undergrads in the recruiting process.

Ian Robertson – Open house(s) have had a major impact on raising awareness (71 frosh this year!)

Gary Messing – use four year scholarships to recruit for the long term. Open houses have been very effective for recruiting high school students and uncommitted frosh.

Agenda topic #4

ABET 2000 review in Fall of 2000

**Department of Ceramic and Materials Engineering
Rutgers University. (Tom Tsakalacos)**

We got an interim visit as a result of the fact that we had only closed the feedback and improvement loop one time.

The reason for this was that we were late in getting all our feedback mechanisms in place, and had only been practicing ABET 2000 for about 1 year prior to this visit.

Tsakalacos

In the ABET 2000 visit in the Fall of 2000, they found that we had three weaknesses:

1. informal and emerging procedures regarding demonstration of achievement of our educational objectives and program effectiveness.
2. outcomes assessment was limited and informal and incomplete, and no process to assess student preparation for grad school was in place, nor was there documentation of student achievement relevant to enter the field.
3. co-op was treated as a capstone design experience, but there were no guarantees in place to insure that all capstone requirements were met by all students.

During the Fall 2002 interim visit, they found that all weaknesses had been resolved! I think we can say that it requires a great deal of effort and commitment to carry out ABET 2000.

I also feel that it gives Departments means to improve its program in real time.

ABET 2000 requires all faculty to buy-in to the process and a very dedicated Undergraduate Director. We plan to create an additional position of ABET Coordinator.

Tsakalagos

Agenda topic #4

Slade Cargill showed proposed changes in the General ABET criteria.

Actually the changes had already been approved in June '03. It was recommended that future changes be brought to the UMC earlier for input.

Also, the possibility for a new ABET applied science in materials for schools not having MatSE departments was suggested by Slade Cargill. There was not enough time for discussion but initial response was to go slow with creating yet another division in the materials community.

Agenda topic #5 was deferred to another meeting

Minutes from the meeting

Topic #6

This is the PDF of Subra Suresh's presentation on the new undergraduate curriculum at MIT (double click)



Acrobat Document

Agenda topic #7 – Need for coherent voice for materials was differed to another meeting. Notes from NMAB sponsored Materials Forum meeting on professional societies was emailed to all UMC members

Agenda item #8 – Plans for UMC-planned session on "Changing Undergraduate and Graduate Curricula" at the FMS Biennial Conference on "Materials Education the 21st Century Workforce," May 24-25, 2004, National Academies, Washington, DC. Plans for next UMC meeting - tentatively Tuesday afternoon, May 25, 2004, Washington, DC, following FMS Biennial Conference.

Minutes reported by Gary L. Messing on behalf of Alan Cramb (12/24/03)

In attendance

Slade Cargill <gsc3@Lehigh.EDU

Alexking@ecn.purdue.edu

Bob.Snyder@mse.gatech.edu

Cammarata@jhu.edu

Carl_koch@ncsu.edu

Clemens@soe.stanford.edu

Daniel.young@wright.edu

davies@lrsm.upenn.edu

duqued@rpi.edu

gogotsi@drexel.edu

ianr@uiuc.edu

j.wittig@vanderbilt.edu

Jonathan E Spanier <spanier@drexel.edu>

jtodd@psu.edu

kdk@mit.edu

kjones@eng.ufl.edu

makinc@iastate.edu

mdudley@notes.cc.sunysb.edu

messaging@matse.psu.edu

misture@alfred.edu

nutt@usc.edu

peterjon@engin.umich.edu

pliaw@utk.edu

P-voorhees@northwestern.edu

Rabolt@udel.edu

smahajan@asu.edu

Ssuresh@mit.edu

tsakalak@rci.rutgers.edu