College of Engineering

Donald P. Visco, Jr., Ph. D.
Associate Dean for Undergraduate Studies,
College of Engineering
You are doing the right thing...

• You are here today making an *informed decision* about your education and your potential career.  
  – Congratulations!

• What **not** to do.

• **Today’s Presentation**
  – Background about the College
  – Programs offered in the College of Engineering
  – Why Akron?
The value of an engineering degree in today’s economic climate...

Engineers Get Rich as Talent War Heats Up

By Alanna Petroff | CNNMoney.com - Thu, Jul 25, 2013 5:00 AM EDT
Majors With The Highest Earnings

1. Petroleum Engineering
2. Pharmacy Sciences/Administration
3. Mathematics and Computer Science
4. Aerospace Engineering
5. Chemical Engineering
6. Electrical Engineering
7. Naval Architecture/Marine Engineering
8. Mechanical Engineering
9. Metallurgical Engineering
10. Mining and Mineral Engineering

Majors With The Lowest Earnings

1. Health/Medical Preparatory Programs
2. Visual and Performing Arts
3. Communication Disorders Sciences
4. Studio Arts
5. Drama and Theater Arts
6. Social Work
8. Theology and Religious Vocations
9. Early Childhood Education
10. Counseling Psychology
About the College...

- Established in 1914 - 12,000+ degrees awarded to date
- About 95 Faculty, all PhDs
- Nearly 2800 Undergraduates (Fall 2013)
  - One of the fastest growing Colleges in the Nation
- Substantially increased research productivity
  - Sensors, engineered surfaces, fuel cells, clean energy technologies, orthopedics, tissue engineering, to name just a few
  - More opportunities for undergraduate students to be involved with cutting-edge research
- More than $7.2M in scholarships for College of Engineering students awarded for 12-13 academic year
- 42% of incoming freshman in the Honor’s College were engineering students.
Enrollment in the College of Engineering
2004 – 2013

Double the undergraduate enrollment since 2004

<table>
<thead>
<tr>
<th>Year</th>
<th>Grad</th>
<th>Ugrad</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1383</td>
<td>291</td>
</tr>
<tr>
<td>2005</td>
<td>1491</td>
<td>289</td>
</tr>
<tr>
<td>2006</td>
<td>1628</td>
<td>266</td>
</tr>
<tr>
<td>2007</td>
<td>1759</td>
<td>279</td>
</tr>
<tr>
<td>2008</td>
<td>1926</td>
<td>291</td>
</tr>
<tr>
<td>2009</td>
<td>2142</td>
<td>314</td>
</tr>
<tr>
<td>2010</td>
<td>2300</td>
<td>356</td>
</tr>
<tr>
<td>2011</td>
<td>2453</td>
<td>363</td>
</tr>
<tr>
<td>2012</td>
<td>2668</td>
<td>388</td>
</tr>
<tr>
<td>2013</td>
<td>2774</td>
<td>412</td>
</tr>
</tbody>
</table>
Undergraduate Degree Programs

All Fully Accredited by ABET

- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Mechanical Engineering

Two new, industry-driven, unique in the U.S. programs

Both approved by the Ohio Board of Regents.

- Aerospace Systems Engineering
  - Only undergraduate aerospace engineering program in the US with “Systems” content

- Corrosion Engineering
  - Only undergraduate program in the US
B.S. Biomedical Engineering

- Three Tracks
  - Biomechanics
  - Instrumentation, Signals and Imaging
  - Biomaterials and Tissue Engineering

Biomedical Engineers design artificial joints and the surgical instruments, medical devices and instrumentation, drug delivery systems and artificial tissues, etc. You need an understanding of the human body and how it functions, along with core engineering principles in order to solve problems in medicine and biology. Biomedical Engineers develop technology to help prevent, diagnose and treat diseases, to help rehabilitate patients and to improve healthcare worldwide.
B.S. Chemical Engineering

*Chemical engineers design plant equipment and devise processes for manufacturing chemicals, pharmaceuticals, polymers, etc., by applying principles and technology of chemistry, physics, biology and engineering.*

Chemical engineers make things. They take chemicals that are available (and cheaper) and transform them into other chemicals that are more expensive. Chemicals. Pharmaceuticals. Biomass.

B.S. Corrosion Engineering (NEW)

*Corrosion engineers integrate knowledge of chemistry, chemical engineering and materials science to manage the effects of corrosions on materials, devices and structures.*

Corrosion engineers come up with strategies and approaches to prevent things from corroding or slowing down the rate of corrosion.
Corrosion Engineering
Department of Chemical and Biomolecular Engr

- Corrosion Costs US $400 Billion per Year
- Nation’s only B.S. degree in Corrosion Engineering

Labs/Research Thrusts
- Power plants,
- Wind mills
- Pipelines
- Bridges
- Fuel cells
- Biomedical Implants

How safe are they?
How long will they last?
How sure are you?

http://www.uakron.edu/uakroncorrosion

National Center for Education and Research in Corrosion and Materials Performance
B.S. Civil Engineering

Civil engineers are responsible for contracted projects from start to finish related to infrastructure in a variety of companies and industries, private, public and governmental.

What is “infrastructure”? Civil Engineers provide the “infrastructure” for the growth and maintenance of municipalities. Bridges, roads, highways, traffic lights, buildings, water treatment, etc.
Department of Electrical and Computer Engineering

B.S. Electrical Engineering

*Electrical engineers are involved with the design and application of small scale electrical circuits as well as large scale power systems, and everything in between.*

Design the electronics for everything. If there is a circuit and electrons flowing, EE’s are involved. Circuits are everywhere.

B.S. Computer Engineering

*Computer engineers are concerned with both the design of computer-based hardware and software as well as their integration into other devices.*

Where computing is essential, a computer engineer will be there. Smart phone, your car, items I can’t even dream of!
Department of Mechanical Engineering

B.S. Mechanical Engineering

Mechanical engineers design, analyze and/or build various aspects of mechanical systems through their understanding of material properties and physics.

If something moves, a Mechanical Engineer is involved. A door, a chair back, a car, a plane, a space shuttle, the cap of a ketchup bottle.

B.S. Aerospace Systems Engineering (NEW)

Aerospace systems engineers manage processes which require input from a variety of constituents to identify optimal solutions as they relate to the aerospace industry.

How did you decide what time to wake up today? You are using systems engineering principles. (Project Management)
Aerospace Systems Engineering (ASE)
Department of Mechanical Engineering

Why ASE?
• 47% drop in the number of students pursuing aerospace careers
• 25,000 new positions for aerospace engineers need to be filled between 2004 – 2014

Why ASE at UA?
• Akron’s long history in the aerospace industry (Goodyear, Guggenheim Airship Institute)
• Several faculty members have active research programs related to the aerospace industry
• Positive feedback received from NASA-Glenn, Parker Hannifin, Lockheed-Martin, ME Industrial Advisory Council, faculty from the Air Force Institute of Technology
• Success of SAE Aero Design teams (15 first-places, 8 second-places, 3 third-places since 1995)
Why UA? Your College of Engineering
“Akron Experience”

1. Student Design Teams
2. Capstone Senior Projects
3. Co-operative Education Experience / Placement / Support Services
Student Design Teams

• Student teams design, budget, build and compete against students at other schools in projects related to their discipline
  – Competitions are regional, national, or international
  – We compete in upwards of 35 of these events each year,
  – Any engineering student can join the team and compete in these competitions.
UA – 2010 NCAA Soccer Championship

While this is Akron’s first National Championship in athletics...

...Engineering teams have been winning trophies for a while!
Student-Engineer

• Right now, I am recruiting you
  – Not for your jump shot, running ability or fast ball
    • For your interest and academic ability
  – To “play” and learn on our (engineering) teams
    • Look at the results and performance

• By and large, topics in courses are the same at most institutions
  – Newton’s 2\textsuperscript{nd} Law of Motion is the same in Akron, California and China.
    • Similar textbooks, similar concepts

• More objective measure?
  – How well are students trained to use the material they have learned?
  – Student design teams
Thomas Paine Quotation...

• “What we obtain too cheap, we esteem too lightly…”

• Paine was speaking about “freedom” as it relates to what would become the American Revolution, but it is applicable in other areas.

• For many of you/your family, The University of Akron is “Akron U”. Since it is so close, so accessible, do you value it too lightly?  
  – Think about that in what I show you next...
In these international, highly-competitive events (typically 100-120 entries), Akron Formula SAE Teams have placed in the top 15 in 12 of the last 16 years.

The last three years, the team competed in **Michigan**, **Austria**, and **Germany**.
FSAE Michigan, 2013

- 105 teams around the world!

Results:
- 7th place Design
- 5th place Fuel Efficiency
- 4th place Skid Pad
- 10th place Auto-X
- 1st place Endurance
- 3rd place Overall (top US team)
University of Akron's Zips racing team ranked 8th in the world

Race car designed, built by engineering students

AKRON, Ohio - If your team name is Zips Racing, you better create a car built for speed.

Engineering students at the University of Akron were up to the challenge and manufactured a sleek, 350-pound formula race car that is currently ranked eighth best in the world out of nearly 500 universities or colleges.

"We were looking for opportunities to move into the top 10 and really make a name for Akron, make a name for the university," said Ryan Kruse, a senior student from Willoughby Hills.
SAE Student Design Teams

**Baja SAE**

Placed in the top 10 teams for Midwest, West, and East competitions in 8 of the last 15 years (1st place 6 times).
SAE Student Design Teams

Aero Design


This year:  2nd Place, Regular Class @ AeroDesign West - 37 teams from 12 countries
PERFORMANCE OF SAE DESIGN TEAMS

NASCAR Rating

<table>
<thead>
<tr>
<th>Top 15 Schools (out of 171)</th>
<th>NASCAR Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   The University of Akron</td>
<td>5915</td>
</tr>
<tr>
<td>2   Ecole de Tech. Superieure</td>
<td>5261</td>
</tr>
<tr>
<td>3   Auburn University</td>
<td>3967</td>
</tr>
<tr>
<td>4   Univ. of Missouri-Rolla</td>
<td>3732</td>
</tr>
<tr>
<td>5   Univ. of Wisconsin-Madison</td>
<td>3604</td>
</tr>
<tr>
<td>6   Rochester Inst. of Technology</td>
<td>2991</td>
</tr>
<tr>
<td>7   Oregon State University</td>
<td>2790</td>
</tr>
<tr>
<td>8   Ecole Poly. De Montreal</td>
<td>2661</td>
</tr>
<tr>
<td>9   University of British Columbia</td>
<td>2414</td>
</tr>
<tr>
<td>10  Tennessee Tech. University</td>
<td>1957</td>
</tr>
<tr>
<td>11  University of South Florida</td>
<td>1848</td>
</tr>
<tr>
<td>12  Embry-Riddle Aero. University</td>
<td>1774</td>
</tr>
<tr>
<td>13  U. of Laval</td>
<td>1759</td>
</tr>
<tr>
<td>14  California State U. – L.A.</td>
<td>1689</td>
</tr>
<tr>
<td>15  University of Sherbrooke</td>
<td>1614</td>
</tr>
</tbody>
</table>
ASCE Student Design Teams

Concrete Canoe and Steel Bridge Design

• Civil Engineering students design, build, test and compete concrete canoes and steel bridges.
• Concrete Canoe – finished 1st in OVC two out of last four years (2nd this year)
• Steel Bridge – finished 1st in OVC the three out of the last four years (CMU, OSU, Pitt, Cincy, Ohio, etc.)
  – Qualified for Nationals (49) – (2nd stiffness; 2nd efficiency; top 15) Host national in 2014.
• ASCE Student Chapter
  – 2013 Robert Ridgway Award (outstanding student chapter – 281)

Other groups of students are involved in various activities as part of the Akron Chapter of Engineers Without Borders.
AIChe Student Design Team: Chem-E Car

- Built a chemically-controlled electro-mechanical race car
- Alkaline fuel-cell power with remote sensing
- Have won National Championship in the past (2001)
- Top-5 in the nation three of the last four years (140 schools)
- This year – 2nd at Regional, qualified for Nationals (SF in Fall)
Robotics: IEEE and ECE Students

**2012 RoboGames**
International Competition, San Francisco, CA

- Bassbot – 1st place
- Foosbot – 3rd place
- Fire Fighting Robot – 2nd place
- Robotic Shooting Gallery – 2nd place
Lunabotics Mining Competition

• Competed again in NASA-sponsored Lunabotics Mining Competition recently.
  • Held at the Kennedy Space Center
  • Third place in “Presentation & Demonstration” (50+ teams)
• Gives NASA innovative ideas and solutions for lunar excavation
Capstone Senior Design Projects

• A culminating design experience for all engineering students
  – Often inspired/supported by industry

• Provides students with additional real-word/experiential learning

1. Autonomous Bassbot
2. Autonomous Foosbot
3. Menu Ordering System, While You Wait
Undergraduate Research

- A wide variety of undergraduate research is performed in the College of Engineering.
  - Several faculty will often work with HS students as well
- **2013 Goldwater Scholar**
  - Renee Calderon (BME), third year student
    - Non-viral gene therapy
    - Plans to pursue a Ph.D. with a research focus on biomaterials and tissue engineering
Women in Engineering Program

- Women in Engineering Class
- Living/Learning Community
- Professional Mentoring Program
- Professional Development Seminars
- Scholarships
- Plant Tours, Outreach, Workshops, Service Learning, and Summer Camps
College of Engineering
Increasing Diversity in Engineering Academics (IDEAs) Program

- IDEAs Scholarships
- Permanent Study Center
- Tutoring/Mentoring
- Field Trips and Speakers
- Summer Internships
- Undergraduate Research
- Community Service
Co-Operative Education Program

• Provides real-world engineering experience for students during their degree program
• Optional, but more than 90% of our eligible UGs participate
  – 5th oldest in the US; started in 1914
• 50% of them accept full-time positions with their Co-op employers
• Co-ops in more than 30 states; private/public companies and government
• Students typically rotate on/off for three co-op semesters starting with the Spring of their 3rd year
  – Some students can start an optional co-op the summer after completing their 2nd year.
• Individualized interaction with staff
E. Sam Sovilla Award of Excellence

• Highest honor bestowed by the Ohio Co-Operative Education Association.

• Won this year by the Co-Operative Education and Placement Office, College of Engineering.
Student Placement

• Record number of employers are attending our Career and Co-op Fairs
  – 1500 students last week and over 160 employers

• 92% student placement within 6 months of graduation

• More than 15% of our alums rise to the top levels of their corporations - CEOs, Presidents, Exec/Sr VPs, etc.

• Several major corporations recruit heavily from UA:
  • 30% of Lockheed Martin’s Maritime Sensors and Systems Division engineers graduated from UA
  • 50% of the engineers at Goodyear’s Tech Center are UA graduates
Students, employers crowd annual University of Akron career fair

By Jim Mackinnon
Beacon Journal business writer

Published: October 8, 2013 - 10:16 PM

Jesse Duke graduates in May from the University of Akron and expects to be gainfully employed by then. Duke, a 23-year-old civil engineering major, was among more than 1,000 University of Akron students on Tuesday who crowded into three floors of the university’s InfoCision Stadium offices for an annual specialty jobs and career fair.

“I actually have a couple of offers on the table,” said Duke, whose hometown is Toronto, along the Ohio River just north of Steubenville. “I spoke with 12 companies so far, just putting my name out there.”

Duke thinks it’s possible he’ll take a job in the oil industry, specifically in hydraulic fracturing, or fracking, of oil and gas-rich shale. He’s already seen how Ohio’s growing Utica shale is boosting the economies of communities where he grew up.

“The shale and fracking wasn’t much when I started college,” Duke said. Now it’s big business, he said.
Some companies that hire our grads...

Wright-Patterson Air Force Base

PEPPERL+FUCHS

Parker

FirstEnergy

Goodrich

Swagelok

_arcadis

ARCADIS

Lubrizol

US Army

Goodyear

GM

L3

URS

LOCKHEED MARTIN
We never forget who we’re working for™

NASA

imagination at work

B&W

carboline®

Firestone

B&d

Bridgestone

Your Journey, Our Passion

Floyd Browne Group
Solutions for Your World
Take away message

- The most cited program rankings are from US News and they are for graduate programs.
  - Based on research funding, subjective prestige, etc.
- US News also reports school rankings for undergraduate engineering programs
  - No metrics used at all
  - Solely based on subjective impression of Deans/Sr. Faculty
    - Prestige

- If you wanted actual metrics to evaluate undergraduate engineering programs, you might consider
  - How do students perform in the things engineers do, such as those captured by the student design teams (design, budget, build, compete)?
  - Do employers hire those students?

With these more relevant metrics...

UA is a top-tier engineering program in the US...in your own backyard.
Thank you for your interest in
The University of Akron’s
College of Engineering