What is an Engineer?

• A Foundation of Science
  – Math
  – Physics
  – Chemistry

• The Creativity of Art
  "Scientists discover the world that exists; Engineers create the world that never was."
  —Theodore von Kármán, Aerospace Engineer
Engineers and Computer Scientists

- Serve Humanity by Improving Quality of Life
  - Tools for Scientific Exploration
  - Communications
  - Infrastructure
  - Environment
  - Entertainment
Engineers and Computer Scientists

- Serve Humanity by Improving Quality of Life
  - Energy Availability and Efficiency
  - Productivity
  - Safety
  - Healthcare
Departments and Programs

Biomedical Engineering
Civil and Environmental Engineering
   Nuclear Engineering (Minor, MS, PhD)
   Construction Engineering (BS, MS)
Chemical Engineering
Mechanical Engineering
Electrical and Computer Engineering
   Computer Engineering (BS)
School of Computing, Computer Science, Computing
   Data Science (BS)
   Software Development (BS, MS)
Materials Science and Engineering
Metallurgical Engineering
Mining Engineering
Geological Engineering
Biomedical Engineering

- Biomedical Implants
  - Pacemakers
  - Hips and Knees
- Biomedical Sensors
- Artificial Organs and Limbs
- Tissue Engineering
- Depression Treatment
- Pre-med
Chemical Engineering

- Sustainable Energy
- Air Quality and Environment
- Materials and Nanotechnology
- Biotechnology and Medical Devices
- Smart Chemical Processes
- Petroleum Engineering
- Multiscale Computational Simulation
Civil and Environmental Engineering

- Environmental
- Geotechnical
- Structural Engineering
- Transportation
- Water and Water Quality
- Construction Engineering
• Computer and Microprocessor Design
• MicroElectroMechanical Systems (Sensors)
• Communications and Electromagnetics
• Image and Signal Processing
• Power and Control Systems
• Semiconductors
• Robotics
• Optics
Medical Applications of ECE

• Jacob A. George
• The Force is with U: Turning Luke Skywalker’s Bionic Arm from Sci-Fi Dream to Real-World Impact
Computer Engineering

- Digital Circuits
- Computer Architecture
- Computer Systems
- System Software
- Networks
Software
Artificial Intelligence/Machine Learning
Computer Applications
Computer Graphics
Databases
Human-Computer Interfaces
Data Science and Analytics
Cybersecurity
FinTech
Robotics
Games Track
Materials Science and Engineering

- Nanotechnology
- Battery Technology
- Fuel Cells
- Environmentally Friendly Materials
- Electronic Materials
- Biomedical Materials
- Extractive Metallurgy
Machines
  Design, Development and Manufacturing

Robotics
  Autonomous Vehicles
  Artificial Limbs

Drones

Composite Materials

Fluidics
Nuclear Engineering Minor

- Nuclear Power Plant Design and Operation
- Nuclear Medicine (Medical Isotope Production)
- Electronics Testing
- Nuclear Forensics
- Industrial Testing
- Food Safety
Mining Engineering

- Critical Materials
- Career Paths
  - Mine operations and planning
  - Environmental engineering
  - Consulting firms
  - Government agencies
  - Project management
- mining.utah.edu
2023 Bachelors Starting Salaries

National Association of Colleges and Employers, Winter 2023 Salary Survey
2023 Bachelors Starting Salaries

National Association of Colleges and Employers, *Winter 2023 Salary Survey*
Median Bachelors Starting Salaries

University of Utah Careers Center Data for 2020-23
University of Utah

- Flagship University
  - Utah's Premier Tech University
- 34,349 students
- 18 colleges, 100 majors
  - Engineering, Medicine, Law, Business
  - World-class research facilities
  - Museums, Concert Venues and Theaters
- Carnegie Classification R1
- $768M Sponsored Project Awards
- PAC-12 athletics moving to BIG-12
- Association of American Universities
Why the University of Utah?

- Wall Street Journal – 11th in Value
- Make the Most of your Abilities
- Salaries from Selective Colleges earn 20% More (Reuters)
- Your Degree is Worth More
  - Work for any company. Attend any graduate school.
<table>
<thead>
<tr>
<th>University</th>
<th>Tuition</th>
<th>Value Added to Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Florida</td>
<td>$3,679</td>
<td>$44,468</td>
</tr>
<tr>
<td>New Jersey Institute of Technology</td>
<td>$17,093</td>
<td>$56,495</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>$17,086</td>
<td>$54,580</td>
</tr>
<tr>
<td>Florida International University</td>
<td>$6,232</td>
<td>$32,946</td>
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<tr>
<td>University of Illinois</td>
<td>$15,483</td>
<td>$50,368</td>
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<tr>
<td>Texas A&amp;M</td>
<td>$20,976</td>
<td>$44,877</td>
</tr>
<tr>
<td>Georgia Tech</td>
<td>$14,820</td>
<td>$71,375</td>
</tr>
<tr>
<td>University of Utah</td>
<td>$12,867</td>
<td>$34,456</td>
</tr>
</tbody>
</table>
Why the University of Utah?

- **Research University**
  - Leading Edge Faculty (all with terminal degrees)
  - Seminars
  - Graduate Students
  - Laboratories and Equipment

- **Signature Experiences**
  - Senior Capstone Projects
  - Undergraduate Research

- **Rich Curriculum**
  - 220 Faculty
  - 684 Courses per year
Engineering Research Expenditures
High School Research Internship

- Work in an Engineering/Computing Research Lab
  - 8 Weeks in the Summer
  - 30 Hours per week
- No Cost for Program
- Submit your Research Project to Utah Science and Engineering Fair
- Applications Accepted December – January
- For Students who Graduate High School in 2024 or 2025
Engineering Scholars

- Research Lab and Company Tours
- Seminars and Workshops
- Research or Capstone Project Team
- Peer Mentoring and Social Events
- Internships
USTAR Microscopy Core Facility
Price Computing & Engineering Bldg.
Senior Capstone Projects
Average Salary (University-wide)
Notable Alumni

Simon Ramo, TRW
John Warnock, Adobe
Gretchen McClain, NASA
Ed Catmull, Pixar
Mark Fuller, WET Design
Jim Clark, Netscape, Silicon Graphics
Lassonde Entrepreneur Dormitory

400 Beds  20,000 sq.ft. of “Garage”  Interdisciplinary
Ivory University House

536 Beds Opened Fall 2023
International Exchange Program

- Partner Universities
  - China
    - Tsinghua
    - Shanghai Jiao Tong Universities
    - Hong Kong University of Science and Technology
    - National Taiwan University
  - Korea
    - Seoul National University
  - Germany
    - Technical University of Berlin
    - Saarland University
  - India
    - IIT Kharagpur
  - Brazil
    - University of São Paulo
Grand Challenges Scholar Program

Efficient Solar Energy

Energy from Fusion

Carbon Sequestration

Manage Nitrogen Cycle

Improve Urban Infrastructure

Access to Clean Water

Healthcare Informatics

Reverse Engineer the Brain

Engineer Better Medicines

Prevent Nuclear Terror

Secure Cyberspace

Enhance Virtual Reality

Advance Personal Learning

Engineer Tools of Discovery
Engineering Clubs

- Engineers Without Boarders
- Nonprofit Humanitarian Organization
- Infrastructure Projects
  - Water
  - Energy
  - Sanitation

Chosco, Bolivia Water Distribution Project
U of U was #1 in Entrepreneurship

- Milken Institute Report
  - Patents Issued
  - Technology Licenses
  - Licensing Income
  - Startups Founded

“The [University of Utah] has quietly evolved into one of the most prestigious research universities in the United States with a strong emphasis on commercializing its research.”

- 100+ Spinout Companies since 2006
Engineers in the Executive Suite

• S&P 500 CEOs
  – 33% have Engineering Undergrad Degrees
  – 11% have Business Administration Degrees
   (SpencerStuart)

• “Engineering skills include analytical thinking and problem solving, which are essential for being in a leadership position.”

• “Engineers who can combine their analytical and critical thinking skills with strong communication ability can be a powerful asset when it comes to top-level decision making.”

   (Kelton Global)
Engineering Entrepreneurship Certificate

Courses

The Business of Entrepreneurship  3 hr  ENGIN 5790
Launching Technology Ventures  3 hr  ENGIN 5791
Entrepreneurship Capstone  3 hr  ENGIN 5020
Patent Law & Strategy  3 hr  ENGIN 5030
Technical Communications  3 hr  CLEAR
Capstone Project or Thesis  5 hr  Department Specific
PCE Freshman Class Size

- Fall 2013: 456
- Fall 2014: 500 (10.5% increase)
- Fall 2015: 450 (10.5% decrease)
- Fall 2016: 520 (25.3% increase)
- Fall 2017: 570 (15.5% increase)
- Fall 2018: 420 (-5.0% decrease)
- Fall 2019: 480 (29.9% increase)
- Fall 2020: 530 (4.2% increase)
- Fall 2021: 570 (19.1% increase)
- Fall 2022: 590 (-6.8% decrease)
- Fall 2023: 640 (15.3% increase)

Total: 456 - 640 (2013-2023)
The U produces 50+% of the USHE BS, MS & Ph.D. graduates in Computer Science and Engineering.
Demand for Graduates - Silicon Slopes

- 1,500 High Tech Companies to 8,147 currently
- Utah Unicorns since 2015
  - Domo, Insidesales, Pluralsight
  - Podium, Venafi, XANT.ai
  - Divvy, Lucid, MX Technologies
- Qualtrics sold for $8B in 2018
Engineering Admission

- Apply to U and indicate Engineering as your Major
- Receive Admission Letter from the U
- Receive Admission Letter from College of Engineering
  - Admitted as Engineering Student or Pre-Engineering Student
  - Three ways to qualify for direct admission
    - GPA of 3.6, ACT of 26, and ACT Math 28
    - GPA of 3.8, ACT of 27, and ACT Math 26
    - GPA of 3.8, Calculus A/B and Strong HS Science
- Accept Admission
- Pay Deposit
- Meet with Advisor in College
- Direct Admission or
- Admission to Department when Pre-requisites are met
  - Typically at end of Freshman Year
Preparation for Engineering

• **Math Readiness (students now choose math class)**
  – Accuplacer CLM 95
  – ACT Math 28
  – SAT Math 630
  – AP Calculus A/B or B/C 3
  – Math 1050 and 1060

• **Other Recommendations**
  – Physics, Chemistry, Biology
  – AP English
  – AP Gen Ed
  – High School Engineering (if available)
Student Leave Policies

- Apply Sr. Year of High School
  - Admission
  - Scholarships
- Admitted with Deferred Start
- ACT, AP and IB Scores will not Expire
- Scholarships Held
- Easy Readmission
- Refresher Course for Math and Science
- Placement into Math not Compromised
- Engineering Math Sequence
Funding your Studies

• Scholarships
  - University, State, Other
  - 600+ Engineering Scholarships & Fellowships ($2,600,000)

• Internships, Part-Time Work, Work-Study
• Federal and State Government Grants
• Student Loans
• Be a Full-Time Student
Summary

• Great Opportunities in Engineering & Computer Science
  – Challenging Curriculum
  – Science and Math plus Creativity
  – Financial Rewards
  – Job Satisfaction
  – Opportunities in Good Financial Times and Bad
  – Engineers and Computer Scientists get Jobs!

• Help Solve the World’s Grand Challenges
  – Energy, Environment, Communications,
  – Productivity, Healthcare

• Come to the U!
  – World-Class Faculty, Facilities, Equipment, & Reputation