



# Engineering as science: would Leonardo be EE today?

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# Engineering as science

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- Fundamentals of engineering curricula:
  - analytical skills
  - mathematical tools
  - programming expertise
- Building on top of fundamentals:
  - various engineering applications
  - IC designs (analog and digital)
  - tools (CAD, EDA, technology specific)
  - consumer technologies: ubiquitous computing



# Engineering as science

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- The difference between science and engineering:
  - science vs. engineering
    - science addresses discovery and understanding of natural phenomena: physics, chemistry, biology
  - computing science vs. engineering
    - difference in the tools and approaches



# Would Leonardo be EE today?

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- Challenges:
  - sheer complexity of today's engineering systems
    - chips, tools, fabrication
  - technological advances
    - examples: personal communication systems
  - need for interoperability of distinct technological solutions:
    - personal communications: wireless, WiFi
    - mobile technology: GPRS, UMTS, Bluetooth, GPS
    - sensor networks



# Would Leonardo be EE today?

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- Many exciting new and emerging fields:
  - biomedical engineering:
    - human genome and genetics
    - pharmaceutical advances
  - circuits and systems:
    - nanotechnologies
    - circuits and systems based on bio systems
  - communications:
    - connectivity
    - performance (quality of service, quality of experience)
    - security and privacy



# Would Leonardo be EE today?

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- Leonardo would embrace the challenges facing the engineering community today, which need to be addressed in hope of improving our quality of life
- Answer:
  - YES.