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# An Inside View on ABET Engineering Accreditor Training

Joseph T. Wunderlich, Ph.D.

Elizabethtown College

Computer Engineering Program

# Inside View?

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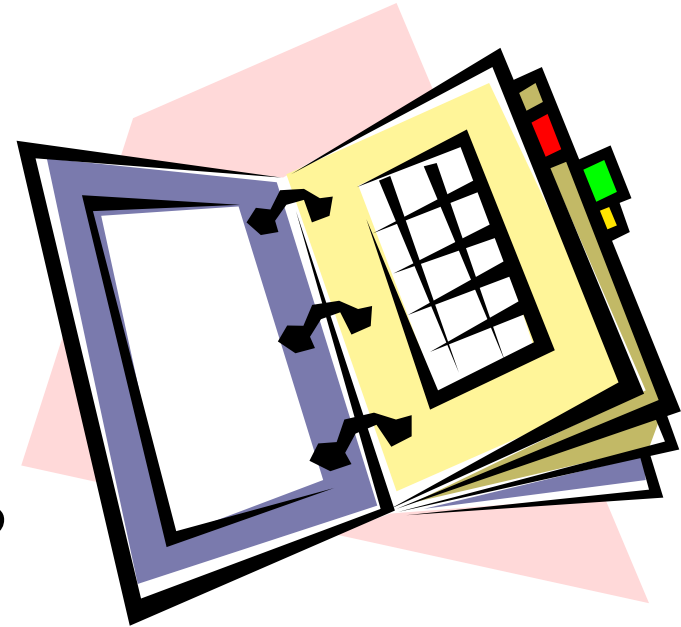


- Most of talk based on notes from one-day accreditor training at ASEE 2001 conference
  - 95% of participants ABET accreditors
- Speaker presently helping accredit program(s) at Elizabethtown College
  - previous experience with EET accreditation at Purdue

# Agenda

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- What is ABET?
- Program requirements
  - Curriculum
  - Objectives
  - Outcomes
- Are you ready for ABET?
- Example program



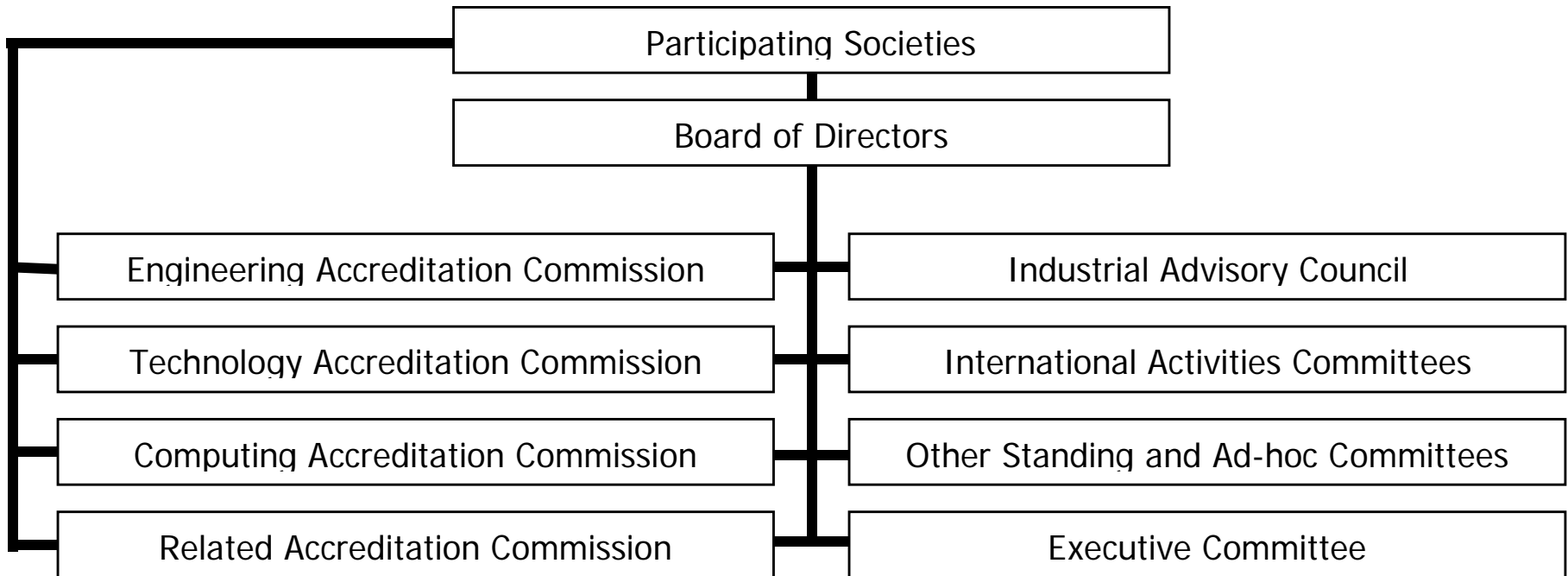
# ABET is:

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- The Accreditation Board for Engineering and Technology
- Since 1932
- 31 engineering and technical societies
- Accredits >2500 engineering, technology, computing, and applied science programs at > 550 colleges & universities

# ABET structure

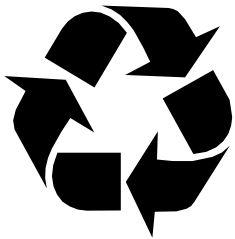
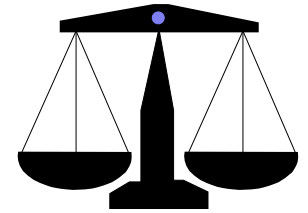
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# ABET standards

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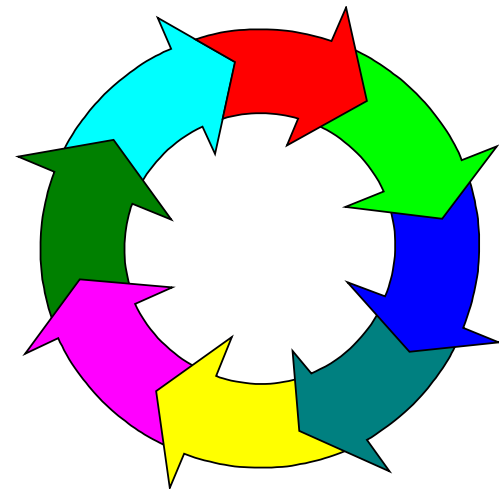
- ABET standards prior to 2000
  - more “prescribed”
- ABET 2000 standards
  - set up systems with feedback
  - define your own program
    - give supporting evidence for quality and coverage
    - ABET will hold you to **your** standards



# Program must:

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- Set goals
- Have internal assessment involving all contributors to program
- Document results (based on "Outcomes")
- Demonstrate results used to continuously improve



# Program should be defined by:

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- **CURRICULUM**
- **OBJECTIVES**
- **OUTCOMES**

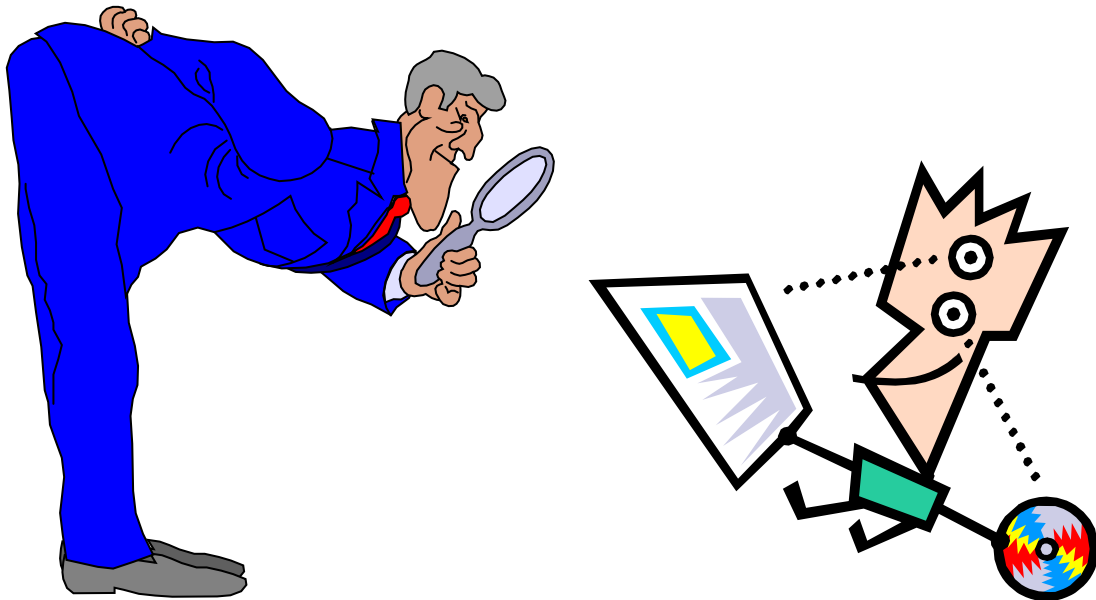




# CURRICULUM

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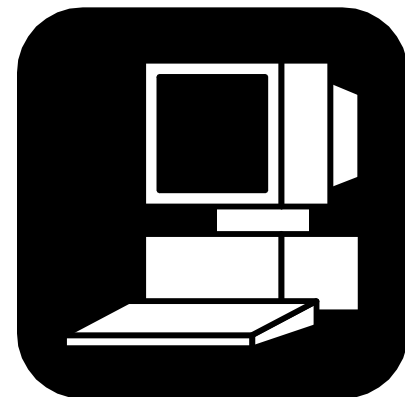
- Different ABET requirements for each type of program
- Some ABET requirements apply to all programs



# Example: a **Computer Engineering** CURRICULUM should include:

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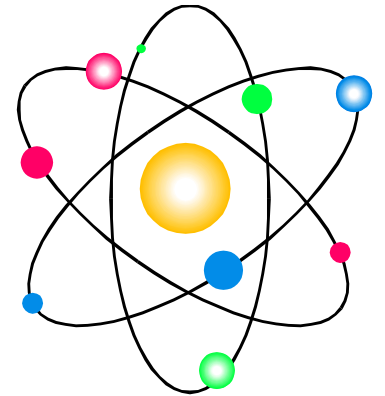
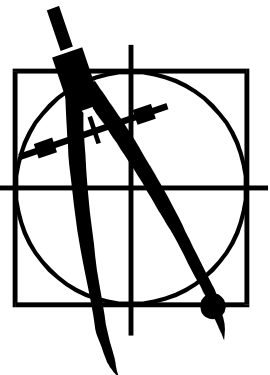
- Breadth and depth across a range of engineering implied by topic
- Probability and statistics, calculus through differential equations, discrete math
- Basic sciences, computer science, and engineering necessary to analyze and design complex electronics and software



# All CURRICULUMS should:

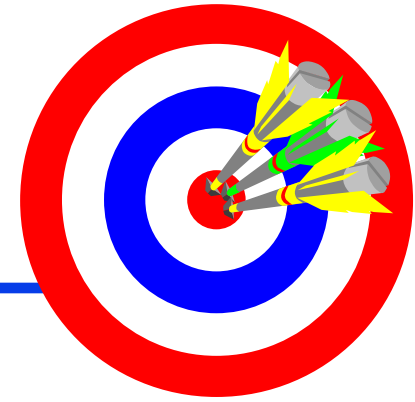
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- Not allow skipping prerequisites
- Have a major design component
  - a "culminating experience"
    - based on knowledge and skills acquired in earlier coursework
- Ok to require non-typical courses
  - just explain why



# OBJECTIVES

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- Clearly state in *vision* and *mission*
- Split objectives ok
  - e.g., "equal emphasis on preparing students for graduate school or employment."
- Non-typical objectives ok
  - e.g., "program strengthened by multi-disciplinary setting"
- Giving students tools for life-long learning is always a good objective

# OUTCOMES

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- Typically faculty assess outcomes for “major” courses
- Surveying graduates not a good way to assess outcomes
- Outcomes specified as “Criterion 3”
  - specify whether or not criteria equally weighted and why
  - all criteria must be met by some part of program

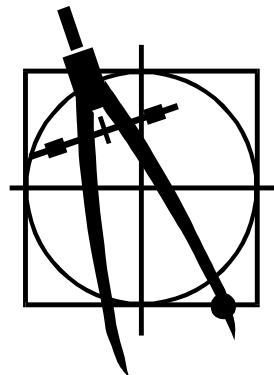


# ABET "Criterion 3"

## OUTCOMES:

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- (a) An ability to apply knowledge of mathematics, science and engineering.
- (b) An ability to design and construct experiments, as well as to analyze and interpret data.
- (c) An ability to design a system, component, or process to meet desired needs.
- (d) An ability to function on multi-disciplinary teams.
- (e) An ability to identify, formulate and solve engineering problems.

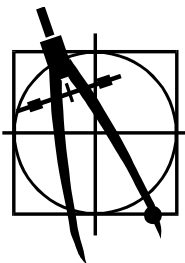


# ABET "Criterion 3" OUTCOMES

## *(continued)*




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- (f) An understanding of professional and ethical responsibility.
- (g) An ability to communicate effectively.
- (h) A broad education necessary to understand the impact of engineering solutions in a global and societal context.
- (i) A recognition of the need for, and an ability to engage in life-long learning.
- (j) A knowledge of contemporary issues.
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



# Are you ready for ABET?

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- Is the program sufficiently staffed?
    - ABET uses the "FTE" (Full Time Equivalent)
    - 1 FTE may be composite of several faculty members
    - ABET judges if enough faculty for:
      - student-faculty interaction, advising, service activities, professional development, and interaction with industry
    - faculty qualifications also assessed



# Are you ready for ABET?

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- Have there been enough graduates from program?
- Is it clear how program is administered?
  - who establishes content?
    - department Chairs?
    - program coordinators?
    - both?
  - accreditor team will be formed accordingly



# Are you ready for ABET?

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- Is there enough equipment to support program?
  - if a concern, include acquiring equipment as part of "Continuous Improvement Plan"
  - demonstrate how added equipment has improved program in the past
- Have "Outcomes" been achieved regardless of any lack of resources? (e.g., money, equipment, faculty)



# Are you ready for ABET?

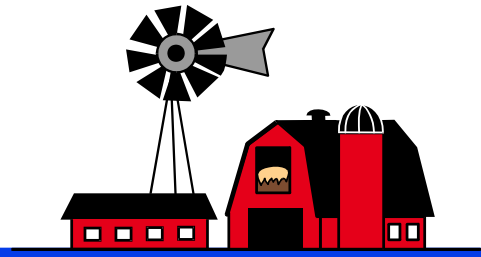
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- Is institution fully accredited?
- Has institution pledged enough resources (money and people) to the accreditation process?
  - self-study and documentation takes much time and effort
- Has "Self-Study" been completed?



# Example

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- Elizabethtown College, Elizabethtown, PA
- Strong liberal arts core in curriculum
- *"U.S. News America's Best Colleges"*:
  - ranked #2 comprehensive, bachelors, North
  - admissions standard: "more selective"
  - 1,735 students
  - 26% business, 19% education, 12% health professions, 10% biology, 10% communications



# Example

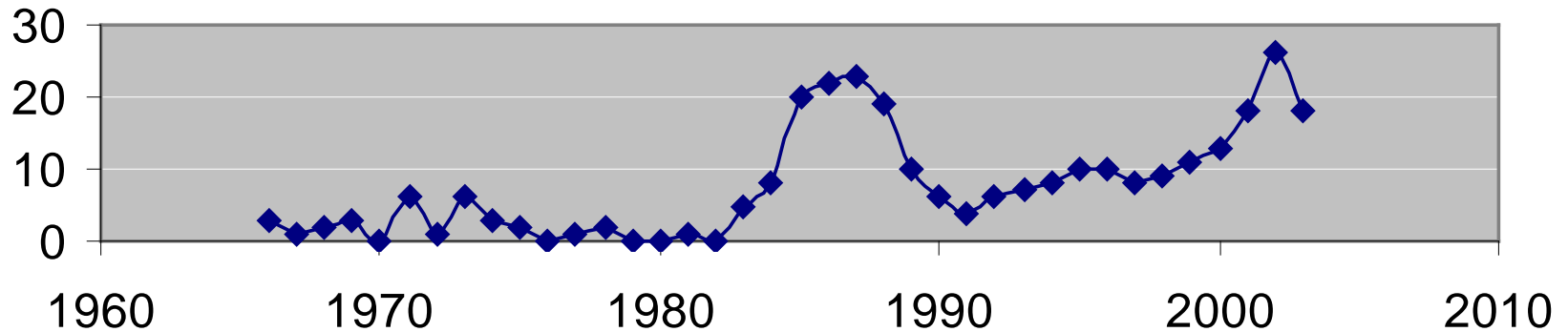
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- Computer Engineering (CENGR) most likely candidate for accreditation
- Others being considered
  - Industrial Engineering (IENGR)
  - Engineering Physics (EGRPY)
- Relationship with related majors considered
  - Computer Science (CS and CSBIS)
  - Physics (PHYS)
  - 3-2's (PRENG) -- BA Etown, BS Engr. PSU

# Example

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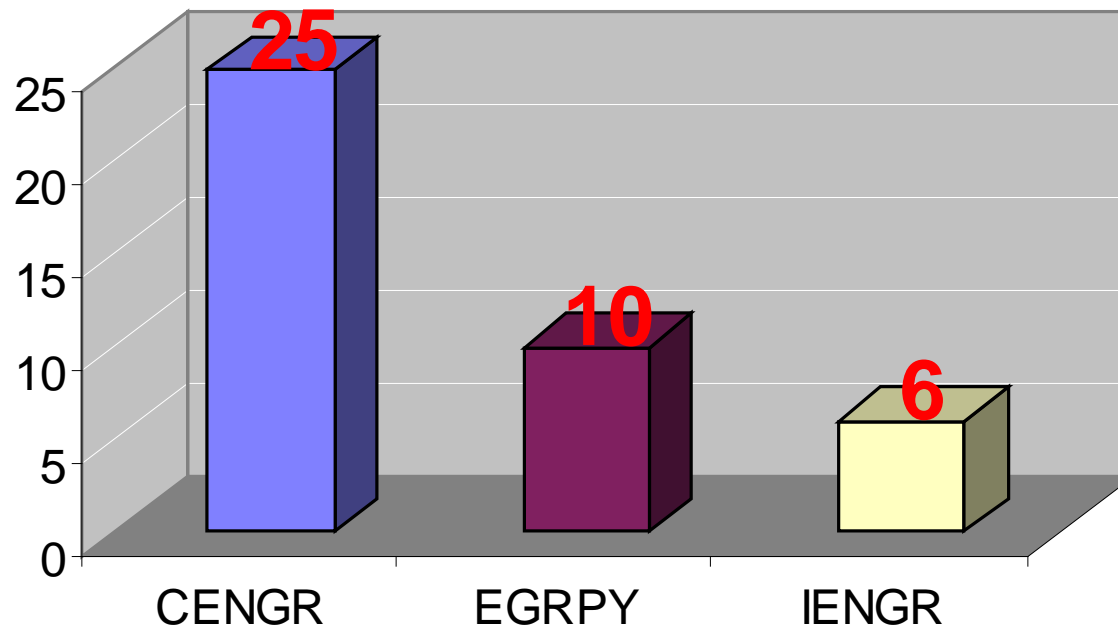
**History of Elizabethtown College degrees  
conferred in  
CENGR, CS, CSBIS, EGRPY, IENGR, PHYS,  
PRENG**



# Example

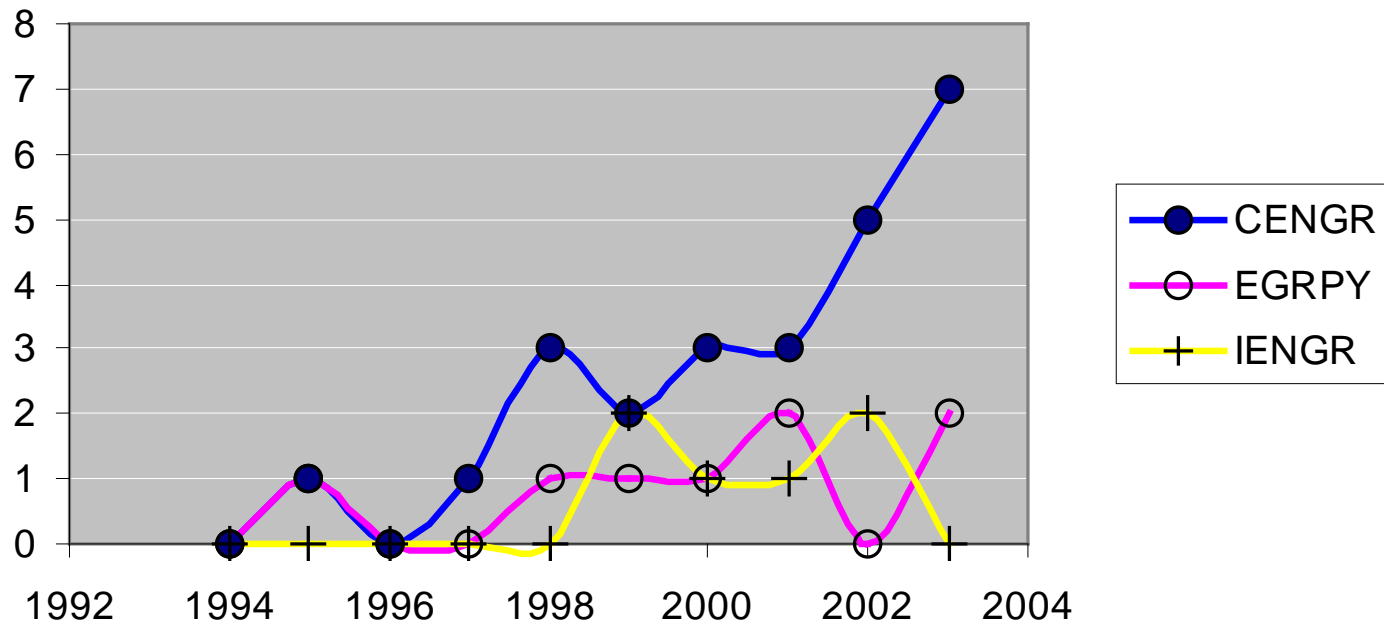
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**Elizabethtown College BS degrees in  
Engineering conferred  
over past 10 years**



# Example

**Trends in Elizabethtown College BS  
Engineering degrees conferred  
over past 10 years**

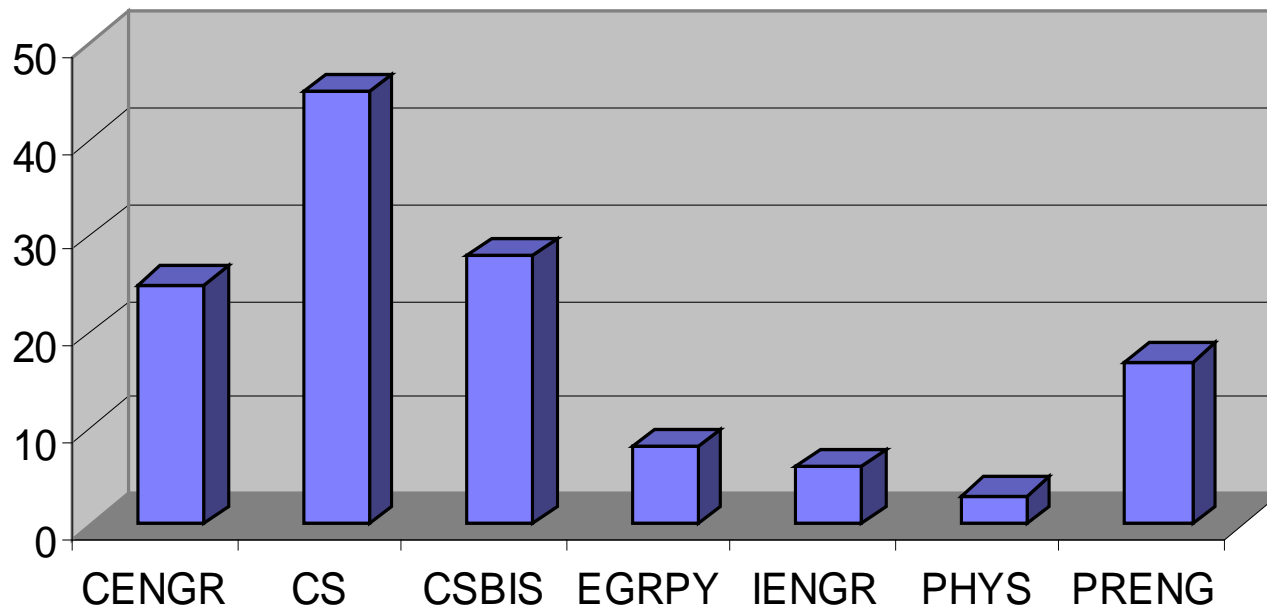




# Example

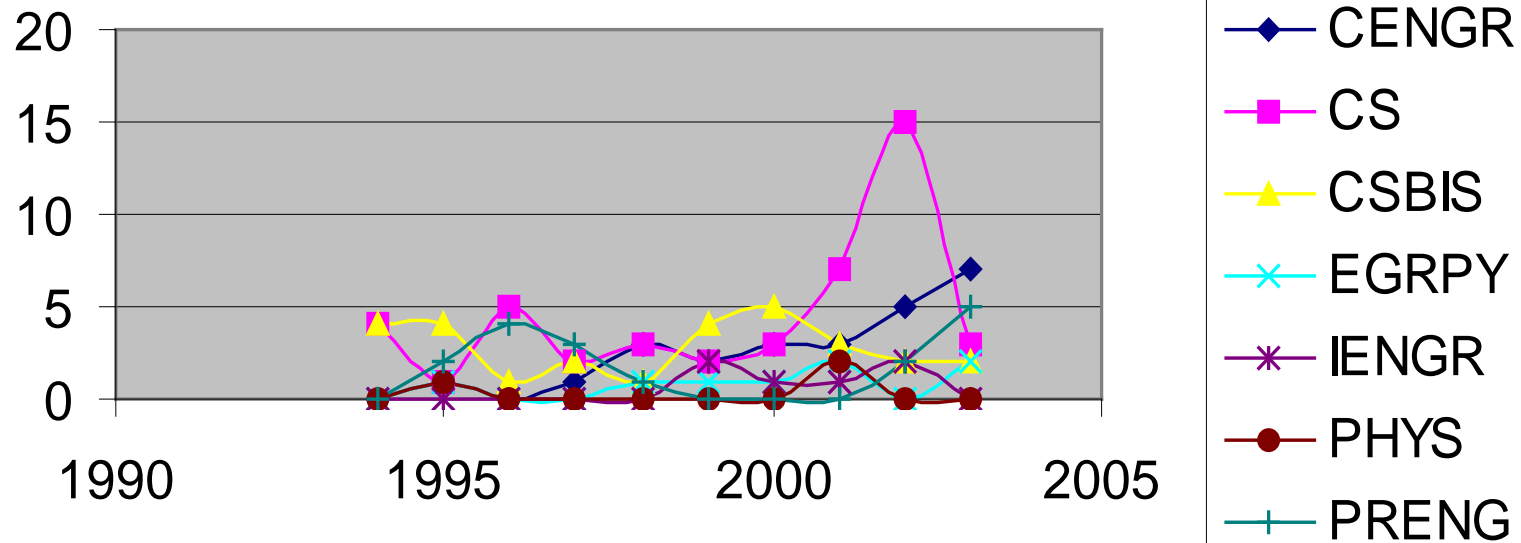
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**Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, and PRENG conferred over past ten years**



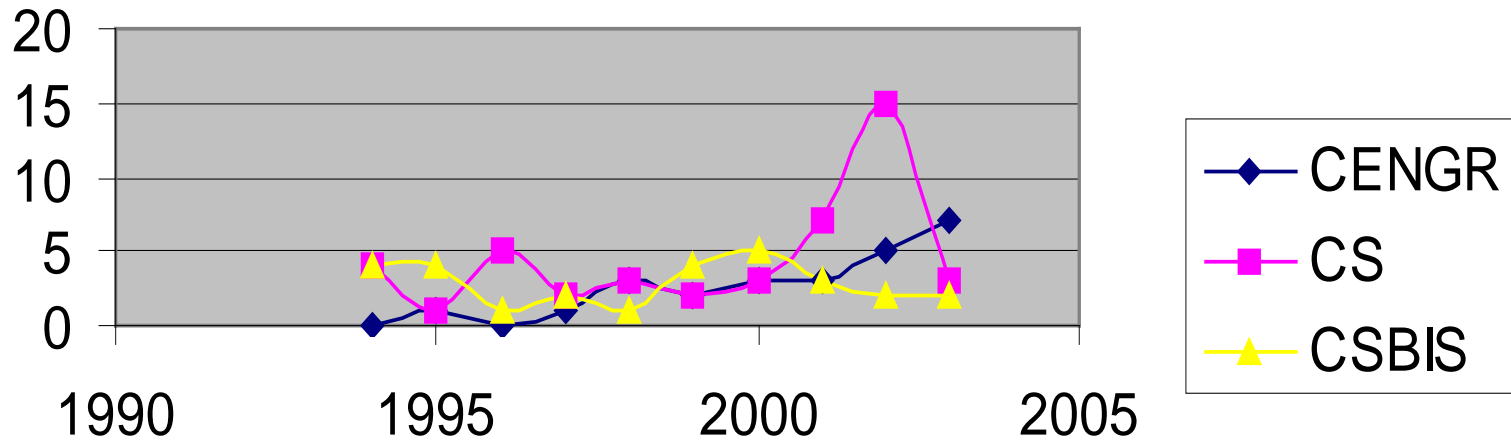
# Example

**Trends in Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, and PRENG conferred over past ten years**



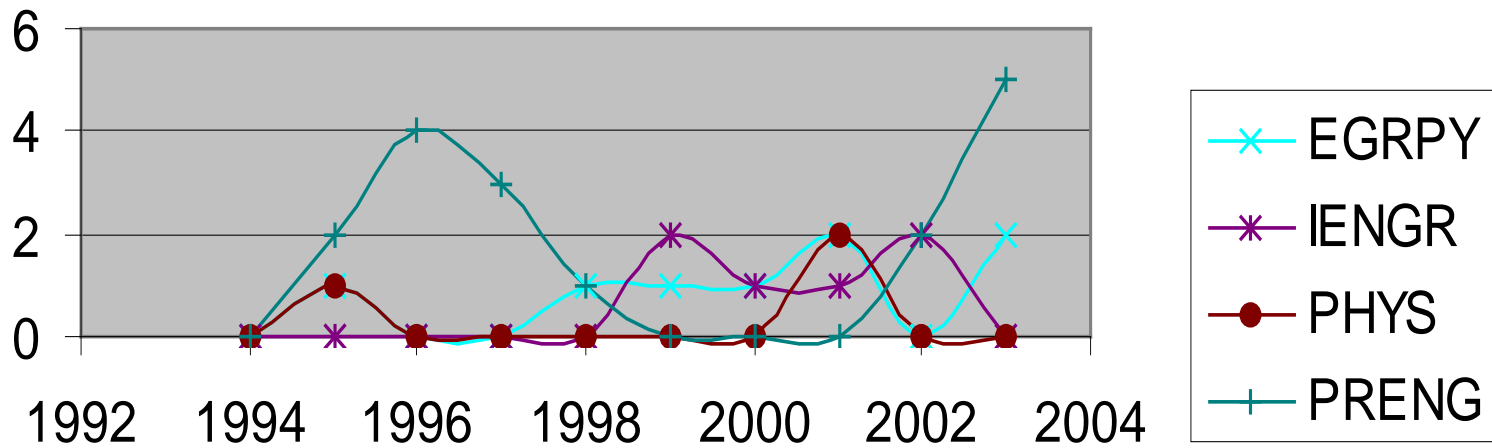
# Example

Etown "computer related" degrees conferred over past ten years



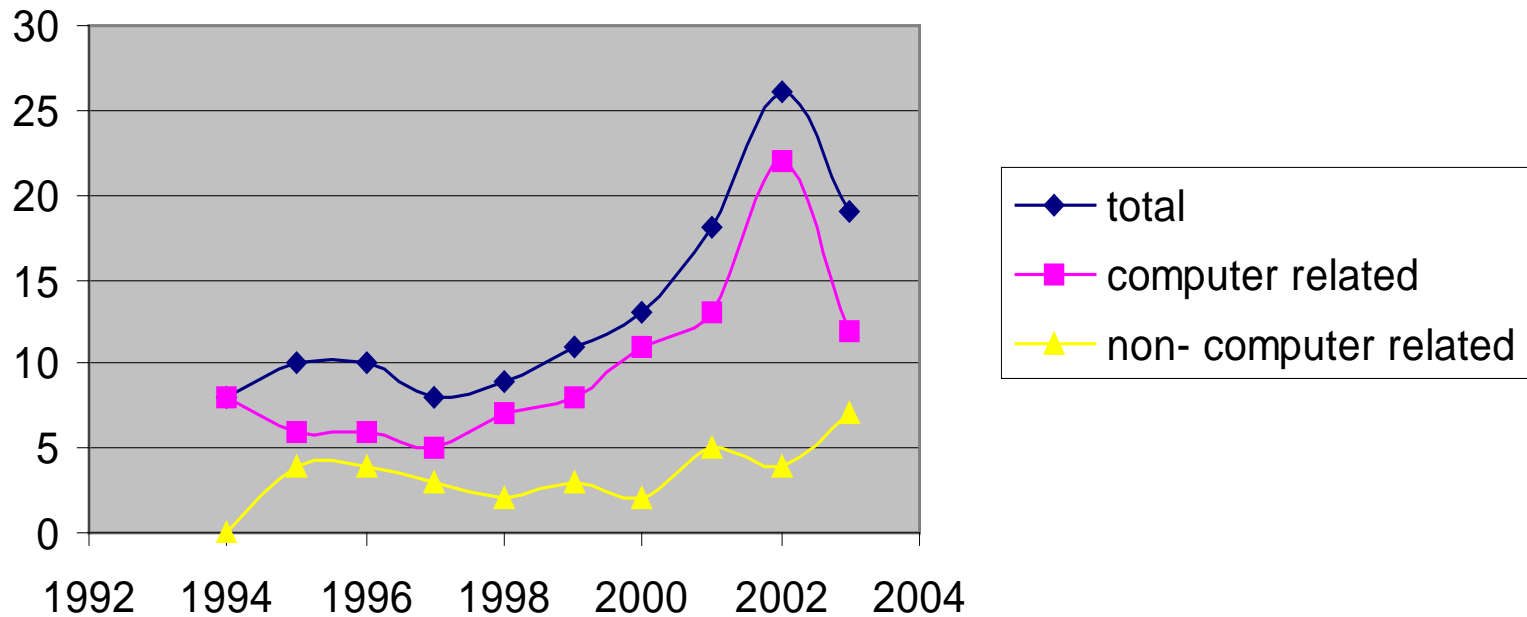
# Example

Etown "non-computer related" degrees conferred over past ten years



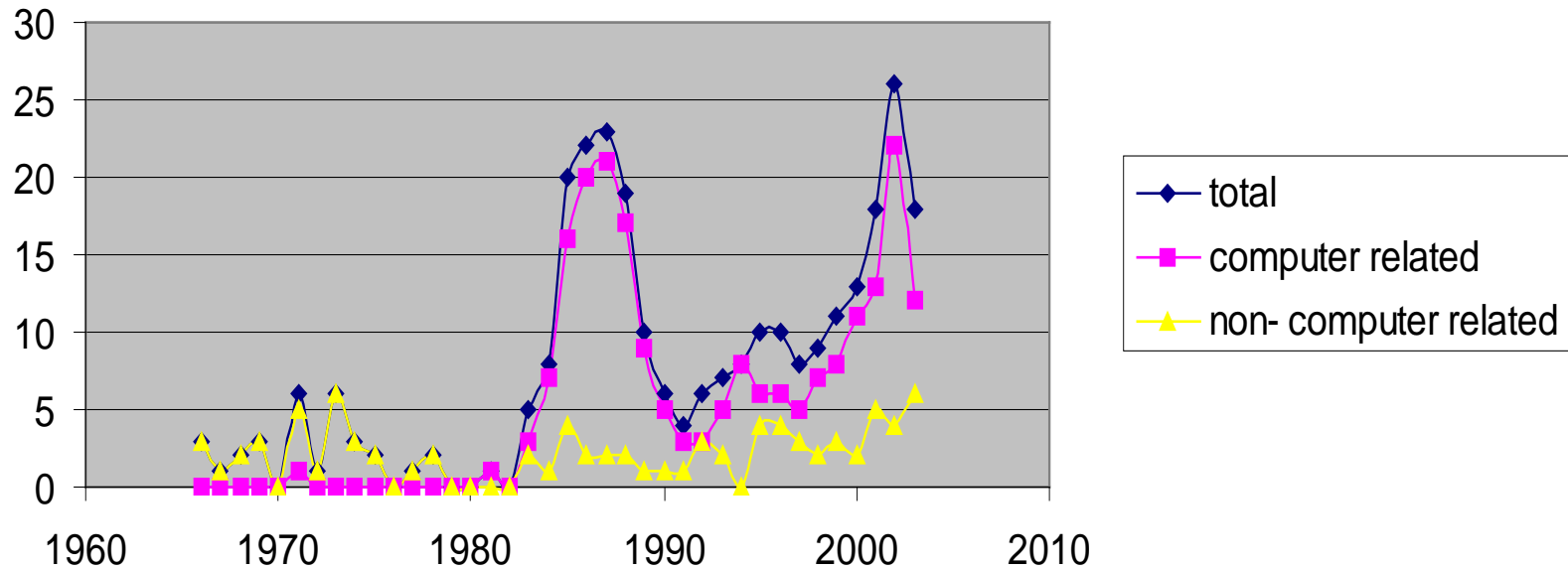
# Example

**Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, PRENG conferred over past ten years seperated by "computer-related"**



# Example

**Complete History of Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, and PRENG conferred (seperated by "computer-related")**



# Example CENGR outcomes

Elizabethtown College Computer Engineering		ABET <i>Outcomes Assessment</i> Scored from 0 to 5*											Comments	
Course	Credit/ Contact	Required	a	b	c	d	e	f	g	h	i	j		k
<a href="#">EGR 100 • Intro to Engineering I</a>	2/4	YES												
<a href="#">EGR 110 • Intro to Engineering II</a>	2/4	YES												
<a href="#">CS 121 • Computer Science I (C+ programming I)</a>	4/4	YES												
<a href="#">CS 122 • Computer Science II (C+ programming II)</a>	4/4	YES												
<a href="#">EGR 210 • Circuit Analysis (analog circuits I)</a>	4/6	YES												
<a href="#">EGR 220 • Electronics (analog circuits II)</a>	4/6	YES												
<a href="#">CS 221 • Data Structures</a>	4/4	YES												
<a href="#">CS/EGR 230 • Microcomputer Architecture</a>	4/4	YES	4	2	5	2	5	3	4	3	5	5	5	board-level design
<a href="#">Phys 302 • Electromagnetism</a>	3/3	YES												
<a href="#">EGR 310 • Signals and Systems</a>	3/3	YES												
<a href="#">CS/EGR 332 • Computer Org. and Digital Design I</a>	4/4	YES	5	4	5	2	5	3	3	1	4	4	5	includes intro to assembly
<a href="#">CS/EGR 333 • Digital Design II and Interfacing</a>	4/6	YES	5	5	5	4	5	4	4	2	4	4	5	includes 80251 assembly
<a href="#">CS/EGR 342 • Computer Networking</a>	4/4	NO												common elective
<a href="#">CS 375 • Artificial Intelligence</a>	4/4	NO	5	5	5	3	5	5	5	5	5	5	5	common elective
<a href="#">EGR 410 • Control Systems</a>	3/3	YES												
<a href="#">CS/EGR 421 • Compiler Design</a>	4/4	NO												common elective
<a href="#">CS/EGR 422 • Operating Systems</a>	4/4	YES												
<a href="#">CS/EGR 433 • Advanced Computer Engineering</a>	4/6	YES	5	5	5	4	5	4	4	2	4	5	5	
<a href="#">EGR 491 • Senior Project</a>	4/x	YES	5	5	5	1	5	4	5	3	5	5	5	

# Example FTE's for CENGR

Faculty	Degrees	Rank	Primary Department	Years of Teaching Experience	Years of Industry Experience	Full Time Equivalent
Member #1	BS, MS, PhD	Assistant Prof.	Phys & Engr	4	5	1
Member #2	BS, MS	Lecturer	Phys & Engr	15	30	1
Member #3	BS, MS, PhD	Associate Prof.	Phys & Engr	7	15	1
Member #4	BS, MS, PhD	Associate Prof.	Comp. Sci.	20	2	1
Member #5	BS, MS, PhD	Assistant Prof.	Phys & Engr	3	4	1
Member #6	BS, MS	Associate Prof.	Comp. Sci.	30	2	1
Member #7	BS, MS, PhD	Professor	Phys & Engr	15	2	1
Member #8	BS, M Eng, PhD	Assistant Prof.	Comp. Sci.	7	7	1
Member #9	BS, MS, PhD	Associate Prof.	Comp. Sci.	30	2	1



# Questions still being discussed

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- FTE distribution?
- Best option for Etown College?
  - BS CENGR
  - BS CENGR, BS Engineering with other options
  - BS ECE (EE newly created program)
  - BS Engineering with options (including CENGR)
- B Eng vs. BS?
- Accredit any title?
- Minimum number of grads per year?
- Where to find best consultants?