Degree Programs in Idaho that Prepare Students for High Demand STEM Careers

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Overview

- Current characterization of STEM

- Career demand in STEM

- AP Introduction to Engineering

- STEM education opportunities in Idaho
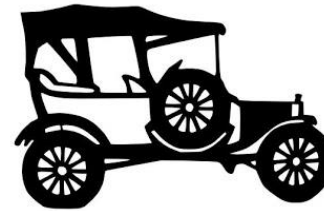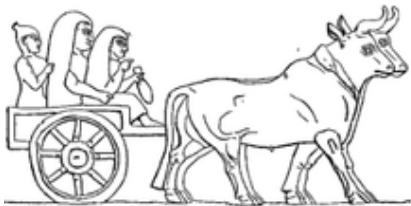
- Supporting diversity in STEM fields

Warnings

1. There are always exceptions.
2. Don't take it personally.

The Future of Work

- Forces of the past: interchangeable parts, electrification, agricultural technology
- Forces of the future: artificial intelligence, sensors, robotics

What is STEM?

- STEM movement "started" around 2000
- STEM is a **WORKFORCE and COMPETITIVENESS** initiative
- STEM is about keeping wages down and immigration
- STEM is losing focus

STEM or STEAM

- "It's an effort to broaden the dialogue that has developed around STEM, or science, technology, engineering and math. Instead of STEM, there is an effort to make sure that art is not left out of the conversation." Pittsburg Bizjournal

Schools should promote the value of every discipline.

The STEM Pipeline

It's Not About Job Growth

Top Job Openings through 2022	
Bureau of Labor Statics	
1	food preparation
2	cashiers
3	wait person
4	nurses
5	customer service rep
6	laborer
7	office clerk
8	janitors
9	personal care aide
10	administrative assistants

It's About Supply and Demand

Majors with Job Offers, NACE 2013

Major	Percentage
COMPUTER SCIENCE	69%
ACCOUNTING	61%
ECONOMICS	61%
ENGINEERING	59%
BUSINESS ADMINISTRATION	54%
SOCIOLOGY/SOCIAL WORK	42%
MATHEMATICS/STATISTICS	40%
HISTORY/POLITICAL SCIENCE	39%
PSYCHOLOGY	39%
HEALTHCARE	38%
LIBERAL ARTS/HUMANITIES	37%
BIOLOGY	35%
COMMUNICATIONS/JOURNALSIM	34%
ENGLISH	33%
ENVIRONMENTAL SCIENCE	30%
EDUCATION	29%
VISUAL & PERFORMING ARTS	28%

Over the last 30 years we have developed an imbalance

University
of Idaho

Number of Graduates

Source: Digest of Education Statistics, 2010.

Science, Math, Computer Science, and Engineering Graduates, 2010
(proportion of all graduates in 2010)
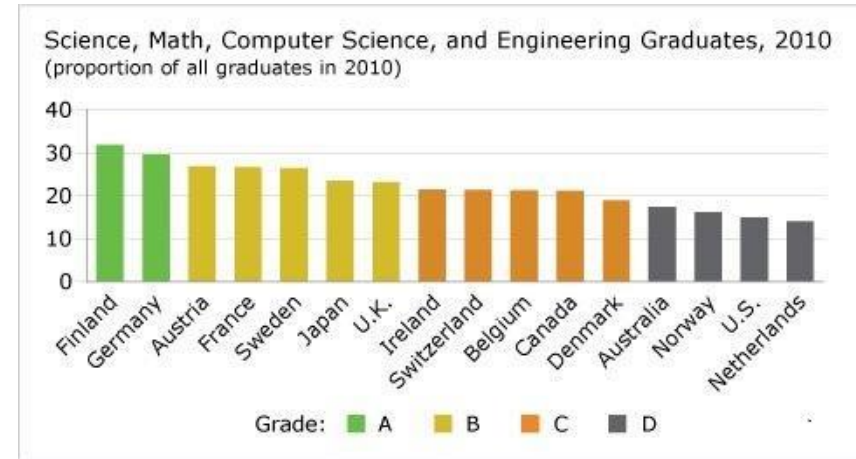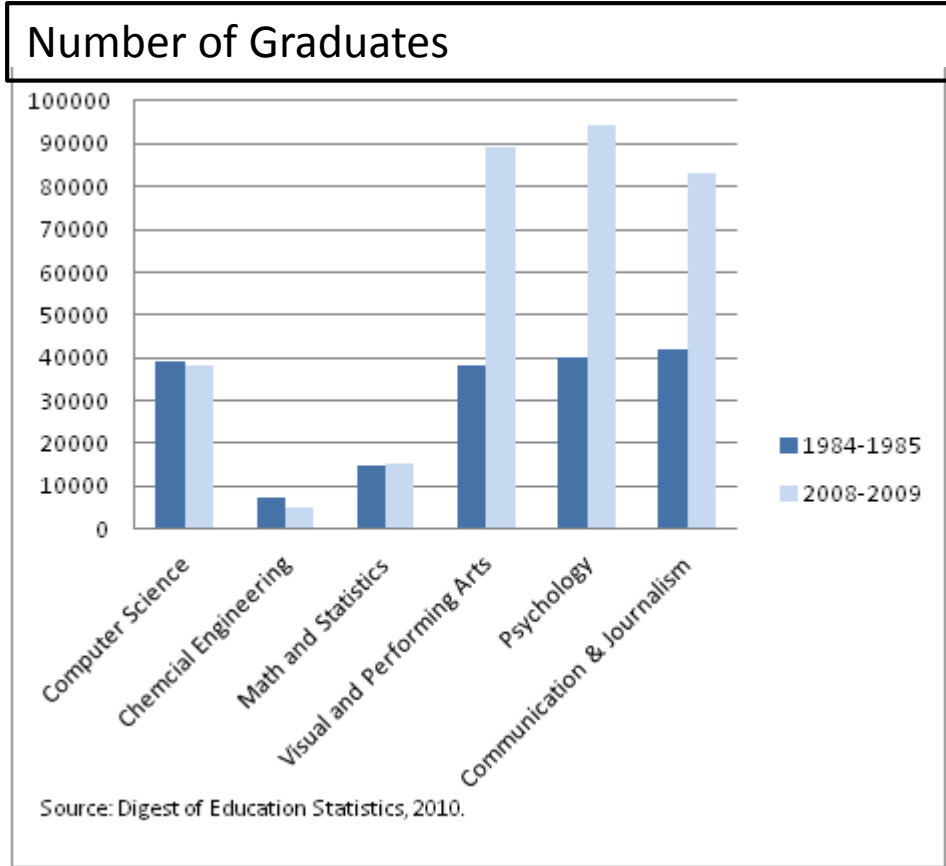
Conference Board of Canada

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Not All STEM Fields are the Same

The Cheshire Cat and Alice

Salaries, Payscale.com

	Highest 15 Majors	
Rank	Major	Salary
1	Petroleum Engineering	$102,300
2	Chemical Engineering	$ 69,600
3	Computer Engineering (CE)	$ 67,300
4	Nuclear Engineering	$ 67,000
5	Computer Science (CS) & Engineering	$ 66,700
6	Electrical & Computer Engineering (ECE)	$ 66,500
7	Electrical Engineering (EE)	$ 65,900
8	Aerospace Engineering	$ 64,700
9	Electronics & Comm Engineering	$ 64,100
10	Materials Science & Engineering	$ 64,000
11	Computer Science (CS) & Mathematics	$ 63,200
12	Mechanical Engineering (ME)	$ 62,100
13	Industrial Engineering (IE)	$ 61,900
14	Software Engineering	$ 61,700
15	Computer Science (CS)	$ 61,600

	Lowest 15 Majors	
Rank	Major	Salary
136	Sociology	$ 38,600
137	Environmental Studies	$ 38,500
138	English Language & Literature	$ 38,500
139	Hospitality Management	$ 38,500
140	Health Sciences	$ 38,300
141	Criminology	$ 37,900
142	Film, Video & Media Studies	$ 37,500
143	Sports Medicine	$ 37,300
144	Psychology	$ 37,300
145	Graphic Design, Illustration	$ 37,300
146	Interior Design	$ 37,100
147	Creative Writing	$ 37,100
148	Music Performance	$ 36,800
149	Broadcast Journalism	$ 36,100
150	Religious Studies	$ 35,700

Not All STEM Fields are the Same

|	Other STEM Majors		
Rank	**Major**	**Salary**	
19	Electrical Engineering Technology (EET)	$	58,900
20	Physics	$	57,200
24	Mechanical Engineering Technology (MET)	$	56,600
27	Civil Engineering (CE)	$	55,100
30	Applied Mathematics	$	54,300
41	Environmental Engineering	$	51,400
60	Geology	$	46,200
72	Chemistry	$	44,200
93	Environmental Science	$	42,000
94	Microbiology	$	41,900
99	Geography	$	41,500
107	Agriculture	$	40,900
111	Biology	$	40,700
112	Forestry	$	40,700
140	Health Sciences	$	38,300

University of Idaho
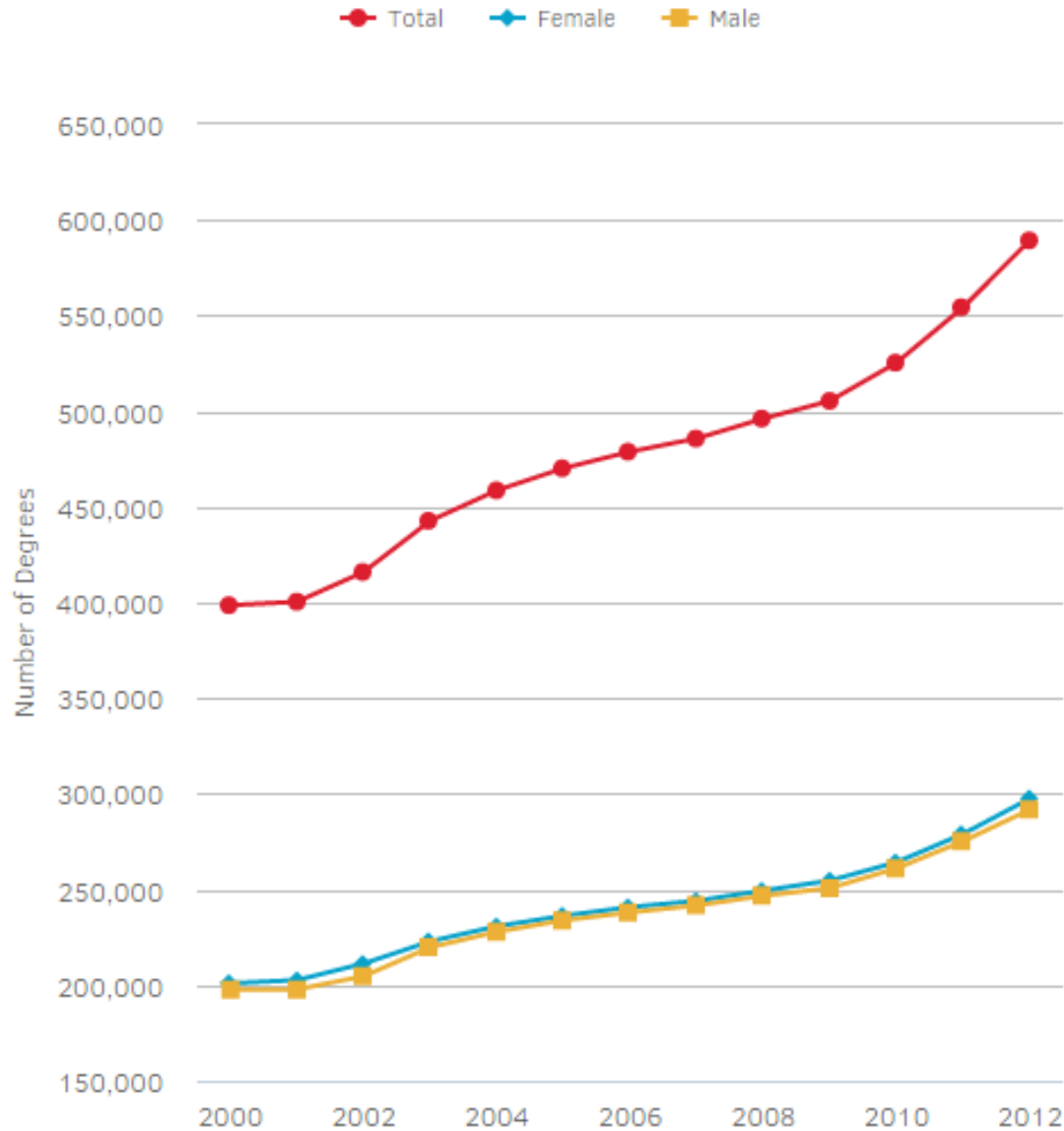
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Summary Comment

- STEM education is vital in junior high to get them thinking of technical careers
- In high school, students need to be encouraged to pursue majors in selected fields of engineering, technology, and computer science
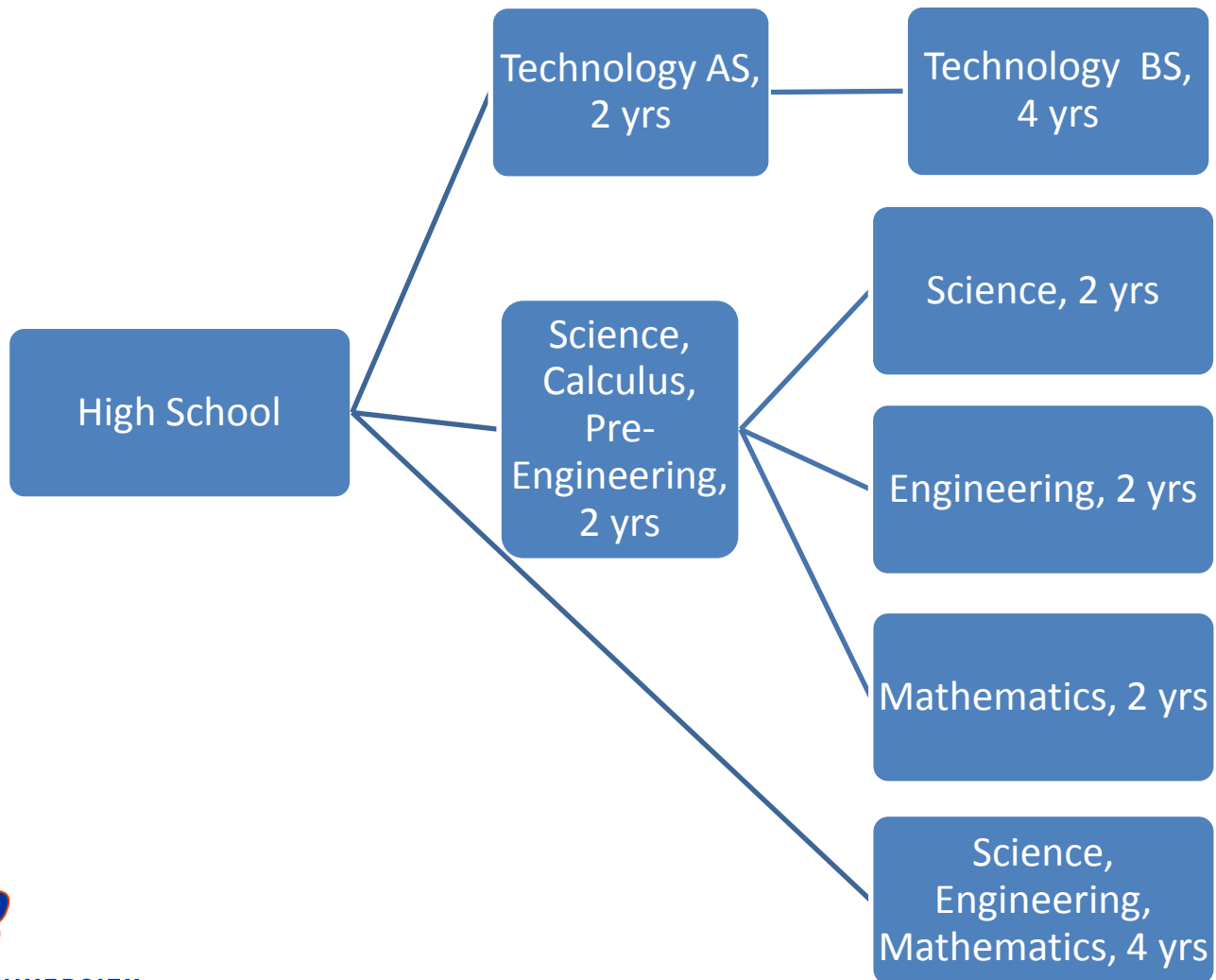
Number of S&E bachelor's degrees, by sex: 2000–12

Field distribution of S&E degrees awarded, by degree level: 2012

Legend:
- Biological/agricultural sciences
- Physical sciences
- Computer sciences
- Mathematics/statistics
- Engineering
- Social sciences/psychology

S&E associate's degrees [N=84,641]

S&E bachelor's degrees [N=589,330]

S&E master's degrees [N=161,371]

S&E doctoral degrees [N=35,360]

S&E associate's | S&E bachelor's | S&E master's | S&E doctorate

Notes:

S&E = science and engineering (excludes health sciences).

Physical sciences = chemistry, physics, astronomy, and earth/ocean/atmospheric sciences.

Women's share of S&E bachelor's degrees, by field: 2000–12 (all citizenship groups)

Legend: Biological/agricultural sciences, Physical sciences, Computer sciences, Mathematics/statistics, Engineering, Psychology, Social sciences
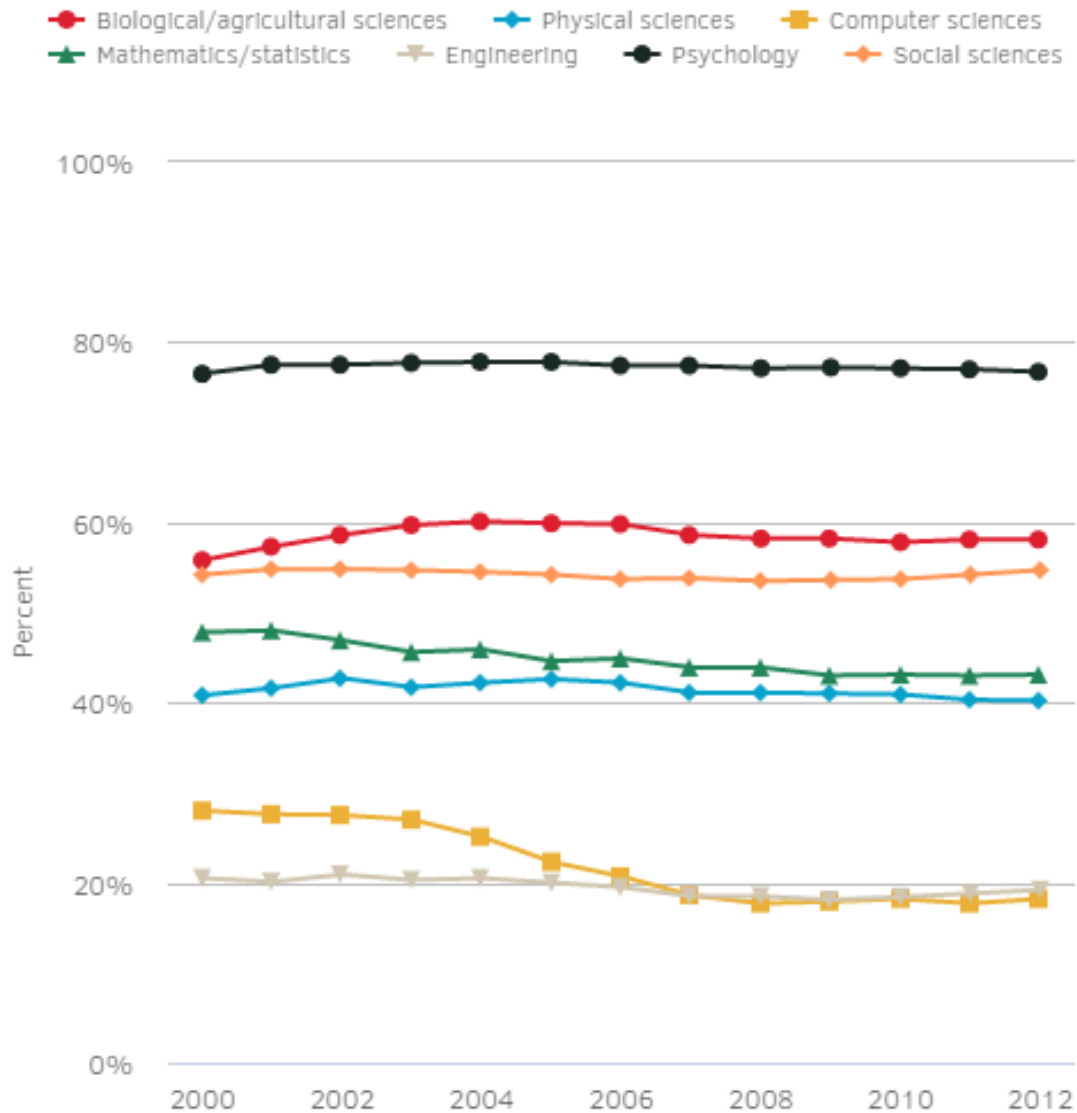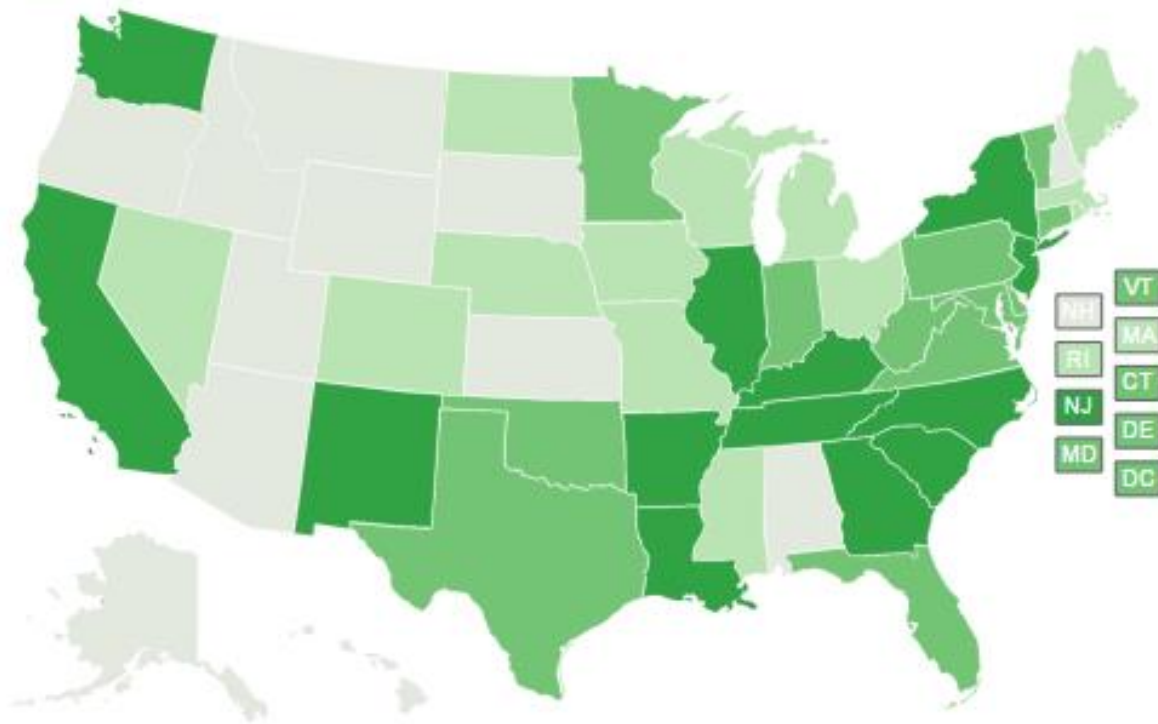
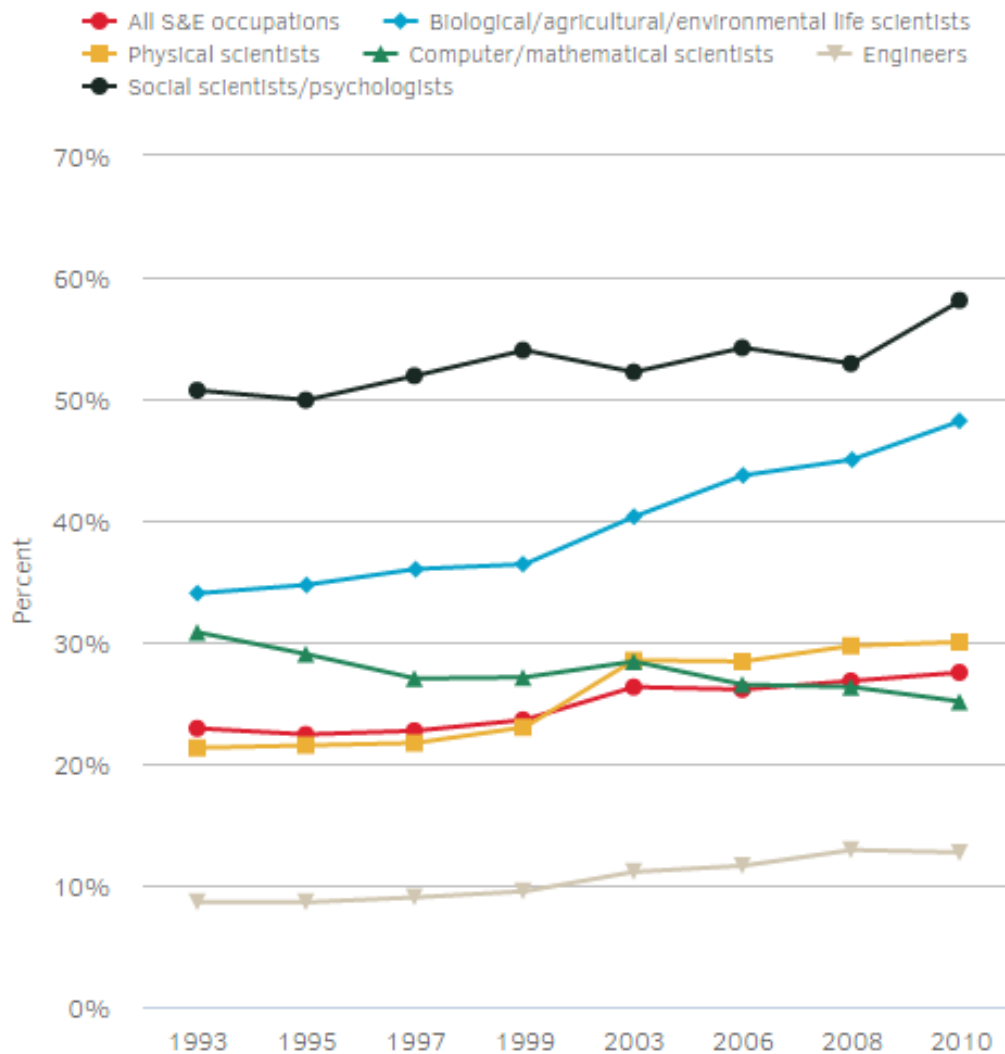Racial/ethnic distribution of S&E bachelor's degree recipients, by field: 2012 (U.S. citizens and permanent residents)

State expenditures on student aid per full-time undergraduate student: 2011

$16 – $223 (12) $223 – $557 (13) $557 – $1,159 (13)

$1,159 – $2,553 (12)

Women as a percentage of all workers in S&E occupations: 1993–2010

Where to get an engineering or computer science degree in Idaho?

B.S. Degrees in Engineering and CS

University *of* Idaho

	UI	BSU	ISU	BYU-I	NNU	CofI
Computer Science	X	X	X	X	X	X
Computer Engineering	X			X		
Electrical Engineering	X	X	X	X	*	
Mechanical Engineering	X	X	X	X	*	
Civil Engineering	X	X	X	X		
Nuclear Engineering			X			
Chemical Engineering	X					
Materials Science & Engineering	X	X				
Biological Engineering	X					

*Note: NNU offers a BS in Engineering with specialization in EE, ME or Engineering Physics

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Technology Programs

	NIC	LCSC	CWI	CSI	ISU	EITC
Engineering Technology Education	X			X		
Information Systems Technology	X				X	
Skilled and Technical Sciences	X		X	X	X	X
Pre-Engineering Education	X	X		X		
	X		X	X	X	

B.S. Science and Math Programs

	UI	BSU	ISU	BYU-I	NNU	CofI
Biology	X	X	X	X	X	
Chemistry	X	X	X	X	X	
Physics	X	X	X	X	X	*
Geological Science	X	X	X	X		
Mathematics	X	X	X	X	X	X
Geography	X					

What should a H.S. student do if they want to major in engineering?

- Well rounded education
- Math
- Science
- Computer programming
- English

How do we get more students interested in engineering?

- http://www.idahostem.org/
- Camps at universities
- STEM Exploration Day
- Discovery Center of Idaho
- Discover Technology Bus
- FIRST Robotics
- Boys and girls club
- Boy Scouts and Girl Scouts activities
- Idaho Science and Aerospace Scholars
- Let us know how we can help!

Myths about majoring in engineering

- You have to be in calculus in HS
- You have to love math
- You have to be a nerd
- Engineers are anti-social

AP Introduction to Engineering

- Engage students in collaborative engineering processes to create solutions to meet the needs of society. The processes are:
    - Frame problems and opportunities
    - Define design requirements and specifications for solutions
    - Address constraints and assumptions
    - Evaluate solution alternatives
    - Engage in iteration to refine and improve attempted solutions
- Explore a variety of engineering disciplines (e.g., biological, chemical, civil, electrical, mechanical, etc.) as they engage in multidisciplinary projects

AP Course Content

- 20 page curriculum framework
- Big Idea 1: Engineering and Society
- Big Idea 2: Engineering Processes
- Big Idea 3: Essential Engineering Content, Skills and Tools
- AP exam mostly Big Ideas 3
- AP course roll out in 2018

Put the E back in stEm

- Thanks for your attention
- Let us know how we can help.