



Presentation for students about STEM fields

Harvey Mudd College

What is STEM?

Science, Technology, Engineering and Mathematics!

What does this presentation cover?

- Why STEM is important!
- How STEM in college is different from High School.
- Why don't more people go into STEM?
- What kind of careers are available?
- How to prepare for STEM.
- Helpful web links and suggestions

Why STEM is important

- It is where innovation occurs
- STEM changes society
- Think of the power of internet, or your cell phone: how have they affected how we interact; how we think & react; & how it changes the pace of life

Society changes STEM

- Politics, Culture, Economics, Art, Music all have profound influences on STEM

Why STEM is important

STEM is exciting and beautiful on its own.

- Look at Fibonacci Numbers or Fractals!
- You discover the (physical) world around you.
- It requires creativity.
- It seeks truth and proof.
- The fields are always changing, and interacting.
- It is MUCH easier to start in STEM and move into a field in Humanities or Social Science or Arts.
 - It is extremely hard to do the opposite – nearly impossible.

STEM @ college differs from HS

Classes are simply taught differently

Lots of course content is easily taught in large lecture

- Possibly less discussion type courses?

Courses might be taught by grad students, TAs, etc.

- This is especially likely in your first year or two in introductory courses

Why?

- *This savings on faculty time might fund the research at the school!*

Probably 3 class meetings per week, plus lab, not every day.

Lab sections are significantly more important and demanding.

- YOU set up the lab – not set up for you.
- NOT like labs in HS which can be like cooking.
- Lab may take ALL afternoon. Then the write-up.
- Lab may be a separate course or may be combined with the lecture course.

How STEM @ college differs from HS

Rigor: Conceptually challenging courses & hard problems

- Your study habits from HS may not be adequate.

The Prof might not discuss what is in the book *at all*!

- May require you to read it and understand it on your own.
- Lecture may go on tangents or merely provide supplemental information to text.

Courses are sequential (vertical) as opposed to horizontal (humanities).

- Ex. You will need General Chem before Organic or P-Chem.
- You may have less free electives as a result.

Expect to do a Senior Thesis

How STEM @ college differs from HS

These courses often attract the better college students.

- Can be a competitive situation, perhaps cut-throat.

Grading may be on a curve.

- Less grade inflation than other subjects (55% may be an A).
- Grade may be based on a few exams and little homework.
- Professors may be unwilling to accept “extra credit”.
- Perhaps the course is designed to “weed out” those who aren’t doing well.

Course content & grading methods may be intimidating.

- It turns out that scientists have small failures ALL THE TIME. It is a part of learning!

Tips for success

Work in teams!

- Even if the course is not set up that way (unless the course discourages team learning).

Persevere!

- Seek help from faculty, tutoring services, students in the major a year or two ahead of you.
- This is not a sign of weakness, but a sign of determination and of resourcefulness!

Why don't more people go into STEM?

Societal images.

- If you close your eyes and imagine a mathematician or engineer working on a problem, chances are great that you think of a man. (Ugh!)
- STEM is perceived as too nerdy. (Oh, and lit lover is somehow “bookish” but not nerdy? C'mon!)
- People think scientists work in isolation. (false.)
- That it is not a helping profession. (False.)
- It is too narrow a field. (Some areas are specialized, many are not.)
- It is too hard. (It is hard, not too hard.)
- Failure to recognize and inspire the thrill of Discovery!

Why don't more people go into STEM?

- In USA, we have a distorted view of Math, and we don't teach it well enough.
- Math is a language; the language of science.
- Scientists use Math the way a journalist uses the alphabet. It is a tool.
- Not enough math teachers in high school majored in Math or Science.
- We feel you have to be “gifted” to be able to do Math.
 - It turns out that working at it is more important.
 - Were you able to kick a soccer ball well the first time? Did you give up?

STEM careers

The potential for flexible working hours.

You get to work on projects.

Your creative instincts and interests may be needed!

You actually contribute to the advancement of society.

- May be tangible or intangible

The joy of discovery or of solving a tricky problem.

You may work with really sophisticated instruments.

Learn that it is OK to fail – even fail repeatedly – if your attitude is right.

- This builds your confidence and resilience!

STEM careers

STEM careers are highly collaborative.

Communication skills are critically important.

The field is always changing.

Your career may morph into a managerial position.

You can always start in a science field and later decide to do something else: law, arts, business, etc.

Salaries tend to be on the high side.

STEM careers are in high demand!

Accountants

Engineers of all types

**Scientific Researchers (Chemists, Biologists,
Environmental, Physicists)**

Pharmacy

Mathematicians are incredibly valuable

- In MANY industries; in politics; in media; everywhere

STEM careers are in high demand!

Consultants

Food Scientists and Nutrition Specialists

Computer scientists, programmers, designers

Medical and Clinical Lab technicians

Digital Imaging specialists

- Video games, entertainment industry, medical devices

How to prepare for STEM

Take 4 years of Math. Try to take Calculus in 12th.

Take rigorous English courses! Really!

Take as much lab science as possible.

- Physics is the building block of science.
- Chemistry is the glue that holds elements together.
- Computers are everywhere!
- Biology and Environmental are the most derivative science fields.
- They are also interacting with the other fields with increasing frequency and are among the “hottest”.

How to prepare for STEM

Take as many difficult courses as you can manage.

- Course content is critical because college courses are “content heavy”.

Get good grades.

Extra-curricular activities expose you to STEM.

- Math clubs, Science fairs, Science Olympiad, Robotics

Summer programs widen your appreciation

Talk to family friends who are involved in science fields

The SAT or ACT has more influence than we may prefer. If you can prep for it, do.

Helpful Links to inspire & inform

Society for Science <http://www.societyforscience.org/>

National Academy of...

- Biology, Engineering, Chemistry, Physics, etc.
- Each has its own web site.

Professional societies

- American Chemical Society, <http://portal.acs.org/portal/acs/corg/content>
- American Physics Society, <http://www.aps.org/>
- American Institute of Physics, www.aip.org
- Society for Mathematical Biology, <http://www.smb.org/>
- Society for Neuroscience, www.sfn.org

Your local university

Local industries

Helpful Links to inspire

Discover what Engineering is about while in high school

- www.TryEngineering.org
- www.engineeryourlife.org
- <http://societyofwomenengineers.swe.org>

To encourage students of Color:

- Society for Advancement of Chicanos & Native Americans in Science (SACNAS), www.sacnas.org
- National Society of Black Engineers www.nsbe.org
- Society of Hispanic Professional Engineers www.shpe.org
- Black Data Processors www.bdpa.org