What the Research Says:

What shapes students career interests... careers of parents, close family member, or friends; ...encouragement from family, family friend, mentor, teacher

Where students get career information... television, books, internet, magazines, other media and school

Students perception of STEM (Science, Technology, Engineering and Math) work ... tedious, sedentary and antisocial

Students perceptions of scientists and engineers... intelligent, bad dressers, work obsessed, no hobbies/outside interests, socially awkward, absent-minded, uncool
What the market says:

Total Job Openings through 2014

- 8% expansion expected in the Massachusetts economy = 265,800 new jobs.
- Replacing workers who retire, change careers, or advance = 799,200 jobs

Total by 2014 = 1,065,000 job openings
Fastest Growing Occupations 2004-2014

Network Systems and Data Communications Analysts: 43%
Computer Software Engineers, Systems Software: 39%
Computer Software Engineers, Applications: 39%
Home Health Aides: 38%
Biomedical Engineers: 34%
Biochemists and Biophysicists: 32%
Medical Scientists, Except Epidemiologists: 32%
Medical Assistants: 32%
Database Administrators: 30%
Hazardous Materials Removal Workers: 30%
Veterinary Technologists and Technicians: 30%
Atmospheric and Space Scientists: 30%
Personal and Home Care Aides: 30%
Physician Assistants: 29%
Network and Computer Systems Administrators: 29%
Physical Therapist Assistants: 26%
Diagnostic Medical Sonographers: 25%
Preschool Teachers, Except Special Education: 25%
Environmental Engineers: 24%
Dental Hygienists: 24%
What does this all mean?

Massachusetts is expected to gain **8500 new biotechnology related jobs** by the year **2014**. 

\(^4\)
You CAN make a difference

- **Biotechnology** uses living cells and materials produced by cells to create pharmaceutical, diagnostic, agricultural, environmental, and other products to benefit society.

- The science of biotechnology is used to alter genetic information in animals and plants to improve them in some way that benefits people.

- Because biotechnology uses basic ingredients of life to make new products, it is both cutting-edge technology and an applied science.

*Analysts predict that biotechnology will be one of the most important applied sciences of the 21st century.*
Why choose a career in biotechnology?

- A fascinating field at the cutting edge of science

- Groundbreaking discoveries that fight disease, improve food production, clean up and protect the environment, and make manufacturing more efficient and profitable
Why choose a career in biotechnology?

- A fast growing industry in Massachusetts offering excellent opportunities to build your career from entry level to mid management to senior level positions.

- Offers generous salary and benefits packages and many offer tuition reimbursement packages so you can continuously keep up with the newest research in science and technology.
Career exploration on the Web

LifeWorks - Explore health and medical science careers
Interactive career exploration web site for middle and high school students. Browse for information on more than 100 medical science and health careers by title, education, interest, or median salary. Highlights true stories of successful people illustrating the variety of real-life career pathways, from the carefully planned to the unpredictable.

The Fun Works ... for careers you never knew existed
For students in grades 6-9, this interactive site encourages students to explore ways to link to what interests them in future careers. Created by Education Development Center with funding from the National Science Foundation
Career exploration on the Web

Free Sites

- **Mass CIS Career Information Services** Free on-line service to all Massachusetts residents. Provides occupational and educational information to help people make better-informed career and school choices. Mass Dept of Workforce Development, Massachusetts Career Information System (MassCIS)

- **Exploring Career Information - What Interests You?** The Bureau of Labor Statistics' Occupations on this site are categorized according to interests and hobbies common among students. To help students continue their career exploration, each occupational description on the kids' site links to related information in the BLS Occupational Outlook Handbook.
Higher Education Information Center

(Boston Public Library Tel: 877/322-4348, 617/536-0200)

The Higher Education Information Center (HEIC) provides free educational planning information and counseling for people of all ages. Resources include over 3500 college catalogs, 500+ college and career videos and more than 400 books on career, educational and financial aid planning, the use of computerized college and scholarship search systems.
Career exploration on the Web

- **Discover**  Subscriber based DISCOVER® provides guidance and information to help people make important career and educational decisions

- **Bridges.com**— Subscription based online education and career exploration system that provides extensive libraries of education, career and recreation articles in an interactive magazine format

- **Career Cruising**  —Subscriber based interactive career resource designed for people of all ages. If you want to find the right career, explore different career options, or plan future education and training, you've come to the right place!
General trends of biotech company growth

1. **1-50 employees** - involved in research and development.

2. **51-300 employees** – research & development, testing products that progress through clinical trials, following strict FDA regulations.

3. **300+ employees** – research & development, product testing, clinical trials, and manufacturing FDA approved products.
The biotech industry offers a wide range of career opportunities for those with high school diplomas and graduate degrees.

Career Opportunities

Research & Development (Pre-Clinical):
- Discovery Research
- Bioinformatics
- Lab Safety
- VP of Research/Development
  - Discovery Research
    - Scientific Director
    - Associate Scientific Director
    - Principal Scientist
    - Senior Scientist
    - Scientist II
    - Scientist I
    - Senior Research Associate
    - Research Associate

Operations:
- Process/Product Development
- Manufacturing & Production
- VP of Operations
  - Process/Product Development
    - Director of Process/Product Development
    - Process Development Supervisor
    - Process Development Associate
    - Process Development Technician
  - Manufacturing & Production
    - Manufacturing Supervisor
    - Manufacturing Associate
    - Manufacturing Technician (Operator)
    - Manufacturing Instrumentation/Calibration Technician

Quality:
- Quality Control & Assurance
- Direction of Quality
  - Quality Control (QC)
    - Chemistry
      - QC Analyst
    - Microbiology
      - QC Analyst
  - Quality Assurance (QA)
    - QA Manager/Supervisor
    - QA Documentation Specialist
    - QA Documentation Coordinator/Associate

Clinical Research:
- Clinical Research
- Clinical Research Manager
- Director of Clinical Research
  - Regulatory Affairs
    - Manager of Regulatory Affairs
    - Regulatory Affairs Associate
    - Clinical Data Manager/Associate

Finance & Administration:
- Finance
  - Chief Financial Advisor
  - Accounting Manager
  - Accounting Clerk
- Business Development
  - Director of Business Development
- Administration
  - Director of Human Resources
  - Human Resources Representative
  - Safety Manager
  - Purchasing Agent/Buyer
  - Receptionist
  - Administrative Assistant
- Information Systems
  - Manager of Information Systems
  - Systems Analyst
  - Analyst/Programmer
- Legal
  - Patent/IP Attorney
- Facilities Management
  - Facilities Manager
  - Facilities Technician
  - Shipper/Receiver

Chart from the Massachusetts Biotechnology Council’s Biotechnology Industry Directory
Career opportunities in biotechnology companies

- **Research & Development**
  Discovery Research, Bioinformatics and Animal Sciences

- **Operations**
  Process/Product Development, Manufacturing, Production, and Environmental Health & Safety

- **Quality**
  Quality Control, Quality Assurance and Validation

- **Clinical Research**
  Clinical Research, Regulatory Affairs and Medical Affairs/ Drug Information

- **Finance & Administration**
  Finance, Administration, Information Systems and Legal Counsel

- **Business Development**
  Business Development and Marketing/Sales

- **Project Management**
  Project Management for all departments in the company.
Non scientific careers

- Sales and Marketing
- Finance and Administration
- Project Management
- Planning
- Public Relations
- Investor Relations
- Government Relations
- Distribution Management
- Material Planning
- Accounting and Finance
- Legal Counsel
- Mechanics
- Electricians
- Technicians
- Welders
- Heating, Ventilation and Cooling (HVAC)
- Security Guards
- Glass Washers
- Shipping and Receiving Clerks
As companies search for new products, the need for research staff expands. It takes 10-15 years to bring a biotech product through clinical trials and into the marketplace. Many companies formed in late 1980s and early 1990s now have products that are nearing clinical and/or commercial manufacturing.

Some of the largest companies are expanding their product base, and therefore, their manufacturing capacity. Over the next two years, the demand for qualified manufacturing personnel will continue to increase.
Entry level jobs

- Animal Care Technician
- Aseptic Fill Technician
- Documentation Associate/Assistant
- Lab Technicians
- Manufacturing Associate
- Material Handler
- Quality Control (QC) Technician
- Quality Assurance Auditor (QA)
- Documentation Coordinator
- Research Assistant
Scientific Careers…

Entry level jobs

- **Lab Assistant**
  
  Education: High school diploma required, with biotechnology certificate preferred; AS or equivalent experience with scientific background.
  
  Experience: Minimum 1-2 years' related laboratory experience plus high school diploma.
  
  *Approx salary range: $24,000 - $33,000*

- **Glass Washer**
  
  Education: High school diploma required or equivalent.
  
  Experience: Minimum of 0-2 years' laboratory experience.
  
  *Approx salary range: $22,000 - $29,000*
Scientific Careers...
Intermediate level jobs

- **Research Assistant**
  Education: Certificate, AS/BS or equivalent in a scientific discipline  
  Experience: Minimum of 0-2 years' related laboratory experience  
  *Approx salary range: $32,000 - $48,000*

- **Research Associate**
  Education/Experience: BS in a scientific discipline and Minimum 2-5 years' related laboratory experience, OR  
  Education/Experience: MS and 0-2 years' experience  
  *Approx salary range: $38,000 - $50,000*

- **Senior Research Associate**
  Education/Experience: Requires a BS in a scientific discipline and a minimum of 5-8 years' related laboratory experience, OR  
  Education/Experience: MS with 2-5 years' experience  
  *Approx salary range: $52,000 - $60,000*
More advanced level jobs

**Principal Research Associate**

Education: Requires a BS/MS degree  
Experience: 5-8 years' regulatory affairs experience in the development of biological or pharmaceutical products  

*Approx salary range $60,000 - $70,000*

**Scientist I**

Education/Experience: Requires a PhD in a scientific discipline and Minimum of 0-2 years' experience OR  
Education/Experience: MS with 8-10 years' experience in a research environment.  

*Approx salary range $60,000 – 85,000*
Scientific Careers…

Advanced level jobs

- **Scientist II**
  Education/Experience: Requires a PhD in a scientific discipline and a minimum of 2-5 years' experience OR
  Education/Experience: MS with 8-10 years' experience in a research environment
  *Approx salary range* $70,000 - $90,000

- **Senior Scientist**
  Education/Experience: Requires a PhD in a scientific discipline and a minimum of 5-10 years' experience OR
  Education/Experience: MS with 8-10 years' experience in a research environment.
  *Approx salary range* $85,000 - $100,000
Scientific Careers…
Advanced level jobs

- **Bioinformatics Analyst/Programmer**
  Education/Experience: Requires MS or PhD in Bioinformatics, Statistics, Biochemistry, Mathematics, Molecular Biology or Computer Science, Computational Chemistry
  *Approx salary range* $60,000 - $100,000

- **Principal Scientist**
  Education/Experience: Requires a PhD in a scientific discipline and minimum of 10 years' experience in a research environment.
  *Approx salary range* $99,000 – $132,000
Scientific Careers…

Advanced level jobs

- **Vice President of Research and Development**
  
  Education/Experience: Requires a PhD in a scientific discipline and 15 years' management experience.
  
  *Approx salary range* $175,000+

- **Scientific Director**
  
  Education/Experience: Requires a PhD in a scientific discipline and a minimum of 12 years' experience in a research environment.
  
  *Approx salary range* $120,000 - $175,000
If you enjoy science, math, technology, investigating, solving problems and making useful products, a career in biotechnology may be for you.

How to pursue a biotech career

- **Step 1**
  Be well-rounded in all subject areas. Although scientific knowledge is important, people entering biotechnology careers need basic skills such as computer use, effective written and verbal communication, and math ability.

- **Step 2**
  Talk to your guidance counselor and your teachers, tell them you are interested in learning more about careers in Biotechnology. Explore biotech careers on Mass CIS or one of the career exploration sites listed in this presentation.

- **Step 3**
  Be familiar with state and national biotech organizations and professional groups. Gain experience in the industry through internships, co-ops, work study, and job shadowing.
Massachusetts has long been a center of educational excellence, home to many world-renowned 2 and 4 year degree colleges and universities.

The large number and superb quality of these institutions make Massachusetts a magnet for intellectual breakthroughs.

Research work at these institutions has led to the creation of the biotechnology industry in Massachusetts – one of the largest concentrations of biotechnology companies in the world.
Higher education programs in Massachusetts…

Biotechnology and sciences

CityLab Academy

- Free biotechnology and biomedical science job training program
- September – May, Boston University, Medical Campus, Boston
- Attend academic and laboratory courses with Undergraduate BU students in the Biomed Program.
- Receive tutoring, study skills training, and mentoring by graduate students in the medical sciences.
- Earn twelve credits from Boston University Metropolitan College for finishing and passing:
  - Medical Terminology – 2 credits
  - Introduction to Biomedical Laboratory Sciences – 4 credits
  - Biotechnology – 2 credits
  - Cell Culture Techniques – 4 credits
Prepares students for laboratory jobs in a biotechnology company, medical center, or hospital. Students learn fundamental lab skills in both semesters, and, during the spring semester, students complete a two-week, full-time internship in a research or hospital lab on the BU Medical Campus.

Students learn job preparation skills such as resume writing, interviewing skills, and job search strategies.

After receiving the certificate in Biomedical Laboratory Science, receive assistance with finding a job in biotechnology.
Massachusetts schools with degree programs in... Animal Science

Mount Ida College (Newton Centre)
North Shore Community College (Danvers)
Tufts University, School of Veterinary Medicine (North Grafton)
University of Massachusetts, Amherst
Massachusetts schools with degree programs in... Biotechnology

Boston University, College of Arts and Sciences
Eastern Nazarene College (Quincy)
Holyoke Community College
Massachusetts Bay Community College (Wellesley)
Middlesex Community College (Lowell)
North Shore Community College (Danvers)
Northeastern University, Adult & Continuing Education (Boston)
Springfield College
Springfield Technical Community College
Suffolk University, College of Arts and Sciences (Boston)
Tufts University, School of Arts & Sciences, Engineering (Medford)
University of Massachusetts, Boston
Worcester Polytechnic Institute
Worcester State College
Massachusetts schools with degree programs in...

Biochemistry

American International College (Springfield)
Assumption College (Worcester)
Atlantic Union College (South Lancaster)
Boston College, Arts & Sciences (Chesnut Hill)
Boston University, College of Arts and Sciences
Boston University, Division of Graduate Medical Sciences
Boston University, Graduate School of Arts & Sciences
Brandeis University (Waltham)
Clark University (Worcester)
Harvard University, Faculty of Arts and Sciences (Cambridge)
Merrimack College (North Andover)
Mount Holyoke College (South Hadley)
Northeastern University, College of Arts & Sciences (Boston)
Regis College (Weston)
Massachusetts schools with degree programs in...

Biochemistry (continued)

Salem State College
Smith College (North Hampton)
Stonehill College (Easton)
Suffolk University, College of Arts and Sciences (Boston)
Tufts University, Sackler School of Graduate Biomedical Sciences (Boston)
Tufts University, School of Arts & Sciences, Engineering (Medford)
University of Massachusetts, Lowell
University of Massachusetts, Amherst
University of Massachusetts, Lowell, College of Arts & Sciences
Wellesley College
Wheaton College (Norton)
Worcester Polytechnic Institute
Massachusetts schools with degree programs in...

Bioengineering

Boston University, College of Engineering (Boston)
Harvard-MIT, Division of Health Sciences and Technology (Cambridge)
Massachusetts Institute of Technology, MIT (Cambridge)
Tufts University, School of Arts & Sciences, Engineering (Medford)
Massachusetts schools with degree programs in...

Bioinformatics

Boston University, College of Arts and Sciences
Boston University, College of Engineering
Boston University, Graduate School of Arts & Sciences
Harvard-MIT, Division of Health Sciences and Technology (Cambridge)
Springfield College
Massachusetts schools with degree programs in... Biology

American International College (Springfield)
Amherst College
Anna Maria College (Paxton)
Assumption College (Worcester)
Berkshire Community College (Pittsfield)
Boston College, Arts & Sciences (Chestnut Hill)
Boston University, College of Arts and Sciences
Boston University, Metropolitan College
Brandeis University (Waltham)
Bridgewater State College
Bunker Hill Community College (Boston)
Clark University (Worcester)
Massachusetts schools with degree programs in...
Biology (continued)

College of the Holy Cross (Worcester)
Curry College (Milton)
Eastern Nazarene College (Quincy)
Elms College (Chicopee)
Emmanuel College (Boston)
Fitchburg State College
Framingham State College, Graduate and Continuing Education
Gordon College (Wenham)
Harvard University, Faculty of Arts and Sciences (Cambridge)
Holyoke Community College
Massachusetts College of Liberal Arts (North Adams)
Massachusetts Institute of Technology, MIT (Cambridge)
Massachusetts schools with degree programs in...

Biology (Continued)

Merrimack College (North Andover)
Mount Holyoke College (South Hadley)
Northeastern University, College of Arts & Sciences (Boston)
Pine Manor College (Chestnut Hill)
Regis College (Weston)
Roxbury Community College (Roxbury)
Salem State College
Simmons College (Boston)
Simon's Rock of Bard College (Great Barrington)
Smith College (North Hampton)
Springfield College
Springfield Technical Community College
Stonehill College (Easton)
Massachusetts schools with degree programs in...

Biology (Continued)

Suffolk University, College of Arts and Sciences (Boston)
Tufts University, School of Arts & Sciences, Engineering (Medford)
University of Massachusetts Dartmouth, College of Arts and Sciences
University of Massachusetts, Amherst
University of Massachusetts, Boston
University of Massachusetts, Lowell, College of Arts & Sciences
Wellesley College
Western New England College (Springfield)
Westfield State College
Wheaton College (Norton)
Williams College (Williamstown)
Worcester Polytechnic Institute
Worcester State College
Massachusetts schools with degree programs in...

Biomedical Science/Technology

Boston University, College of Arts and Sciences
Boston University, College of Engineering
Boston University, Division of Graduate Medical Sciences
Boston University, Metropolitan College
Boston University, School of Dental Medicine
Dean College (Franklin)
HST/MIT Sloan Biomedical Enterprise Program (Cambridge)
Northeastern University, Bouve College of Health Sciences (Boston)
Northeastern University, College of Arts & Sciences (Boston)
Northern Essex Community College (Haverill)
Quinsigamond Community College (Worcester)
Tufts University, School of Veterinary Medicine (North Grafton)
University of Massachusetts, Boston
Western New England College (Springfield)
Worcester Polytechnic Institute
Massachusetts schools with degree programs in...

Biostatistics

Boston University, College of Arts and Sciences
Boston University, Graduate School of Arts & Sciences
Boston University, School of Public Health
Massachusetts schools with degree programs in...

Marine Biotechnology

Boston University, College of Arts and Sciences
Massachusetts Bay Community College (Wellesley Hills)
Suffolk University, College of Arts and Sciences (Boston)
Massachusetts schools with degree programs in... Clinical Research/Trials

- Boston University, Division of Graduate Medical Sciences
- Bristol Community College (Fall River)
- Eastern Nazarene College (Quincy)
- Fitchburg State College
- Harvard-MIT, Division of Health Sciences and Technology (Cambridge)
- MGH Institute of Health Professions,
- Graduate Program in Clinical Investigation (Boston)
- Springfield Technical Community College
- Tufts University, Sackler School of Graduate Biomedical Sciences (Boston)
Massachusetts schools with degree programs in...
Quality Assurance/Quality Control

University of Massachusetts, Lowell (Lowell)
Massachusetts schools with degree programs in...

Regulatory Affairs

Massachusetts College of Pharmacy (Boston)
Biotechnology Resources

- Massachusetts Biotechnology Council (MBC). Non-profit organization that promotes the biotechnology field in Massachusetts. Link to the Members List to find an alphabetized list of Boston area biotech companies. If you call the MBC at 617-577-8198 (be sure to identify yourself as a student), they will provide you with a list and description of all companies that are MBC members. Lists educational opportunities in biotechnology, available internships, and jobs.
Biotechnology Resources

- **Biotechnology Industry Organization**: International organization in Washington, DC that promotes biotechnology all over the world. Website features biotechnology news stories about global health, bioethics, stem cells, cloning and more.

- **Bio Online**: Learn how to present yourself and your skills when looking for a job. Provides many tips on the job search process including how to work a job fair, prepare for an interview, and other job-related information. Features industry analyses, biotech news stories, scientific conferences, and more.

- **The Biotechnology Institute**: Geared toward young people, Biotechnology Institute’s mission is to engage, excite, and educate the public, about the promise and challenges of biotechnology.
**Biotechnology Resources**

- **Kids 4 Research – kids4research.org**
  "Kids-4-Research" provides information to students, teachers, and parents on responsible laboratory animal care and use in biomedical research, testing, and education. Provides information on the benefits of such research to animals, humans, and the environment.

- **Biotechnology Information Directory** contains over 1500 URLs of companies, research institutes, universities, sources of information and other directories specific to biotechnology, pharmaceutical development, and related fields. Emphasizes product development and delivery of products and services.
Occupational information and job sites


- **Access Excellence at the National Health Museum**
  Originally created by Genetech as a tool for high school science teachers to share ideas, this comprehensive web site has a wealth of information about the biotech industry, education, and careers. [www.accessexcellence.org](http://www.accessexcellence.org)

- **Bio.com** [www.bio.com](http://www.bio.com)
  Online community of scientists, professionals, businesses, and organizations supporting the life sciences, facilitating communication and disseminating information. Includes company profiles, articles, comprehensive list of links to additional educational resources, and a career center with job postings from top biotech and recruitment companies.
Occupational Information and Job Sites

On-Line Biotech Job Web Sites

www.biospace.com
www.pharmahorizons.com
www.sciencejobs.com
www.qa-jobs.com
www.bioexchange.com
www.biocareer.com
www.bio-jobs.com
www.futurebiojobs.com
www.snaiil.com
www.researchcareers.com
www.recruitech.com
www.ajob4scientists.com
www.naturejobs.com
www.hirebio.com
The Partners

MASCA

Massachusetts Department of Education

Center for School Counseling

Outcome Research

MassBioEd
Massachusetts Biotechnology Education Foundation
Works and resources sited

1. *Connecting Today’s Youth with Tomorrow’s Technology Careers*, Joint Ventures: Silicon Valley Network, Inc. 2002 Workforce Study. A.T. Kearney, Silicon Valley, CA
   [http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections](http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections)

   [http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections](http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections)

   [http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections](http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections)

   [http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections](http://lmi2.detma.org/Lmi/FPlmiforms1.asp#Projections)

   [http://massbio.org/directory/careers/overview_m.html](http://massbio.org/directory/careers/overview_m.html)

   [http://massbio.org/directory/careers/overview_m.html](http://massbio.org/directory/careers/overview_m.html)

   [http://massbio.org/directory/careers/overview_m.html](http://massbio.org/directory/careers/overview_m.html)

   [www.biotechinstitute.org/careers/pursue_biotech_career.html](http://www.biotechinstitute.org/careers/pursue_biotech_career.html)