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# STEM Occupations in Maine, 2008

Maine Department of Labor

Maine Center for Workforce Research and Information

Luke Davulis

*Maine Department of Labor*

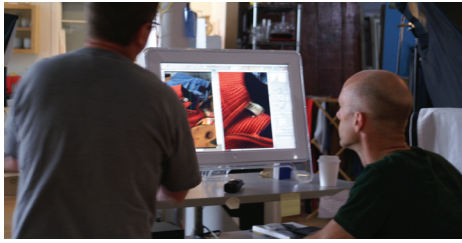
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# STEM

Occupations in Maine

**MAINE**  
**DEPARTMENT OF**  
**LABOR**  
*Center for Workforce  
Research and Information*

# **Science, Technology, Engineering and Mathematics (STEM) Employment in Maine: A Labor Market and Workforce Assessment**

A publication of:  
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## **Preface**

The Maine economy is undergoing constant change. The forces of foreign competition, technology innovation, and business restructuring contribute to dynamic work environments and changing labor markets. Some industries are declining and shedding jobs, while new industries are emerging and creating new employment opportunities. The force of these shifts has challenged individuals, families, and entire communities. Across the spectrum of Maine workplaces, more is being demanded of workers in terms of knowledge, skills, and abilities required for job performance. Increasingly, Maine's competitiveness is determined by the quality and availability of human capital.

Understanding these dynamics is fundamental to making effective public policy and developing sound public investment strategies. Business and workers both must consult economic and labor market information in making critical investment and strategic decisions. The Maine Department of Labor's Center for Workforce Research and Information is committed to examining the dynamics of Maine's economy and the associated impact on the workforce and labor markets.

John Dorrer, Director  
Center for Workforce Research and Information  
Maine Department of Labor



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## **Introduction**

Science, technology, engineering, and mathematics (STEM) are powerful disciplines that shape modern economies. More specifically, STEM occupations have a significant influence across the Maine economy. Thus, ensuring that we have an adequate supply of workers in these disciplines is integral to economic growth and future prosperity.

This report has been prepared to examine employment levels, wages, and occupational projections for STEM occupations in Maine. The report also looks at STEM employment and earnings in Maine and compares them to national levels.

The information conveyed by this report is intended to assist policymakers, economic developers, and education and training specialists to better understand the composition of the Maine workforce and the delicate balances of labor markets for STEM occupations.

## **Overview**

Technology-based industries typically require a highly skilled workforce, and tend to have a disproportionate share of high-growth, high-wage occupations. STEM occupations are among the fastest-growing and highest-paying in the United States. They are projected to grow 22 percent between 2004 and 2014, compared to 13 percent for all occupations. Average pay for STEM occupations is seventy percent above that of all occupations. Although STEM occupations represent less than five percent of total employment, both in Maine and the nation, the high wages and projected growth of these occupations makes them instrumental to our ability to compete in the regional, national, and international economy. This shift toward high-quality STEM occupations and industries offers an excellent opportunity for both Maine and America to compete in the global economy.

A poignant example in the Maine economy involves employment in the manufacturing sector. Between 2002 and 2006, the number of people employed in the sector decreased by 6,050 jobs however, during the same period, the number of people employed in STEM occupations within this sector increased by 980. The decrease in overall employment combined with the increase in STEM employment implies a significant shift. Manufacturing in Maine is moving toward using higher-technology and advanced manufacturing techniques to produce more with fewer employees at high wage rates.

## **Defining STEM Industries**

Research and development, technology innovation, and information science assume a central role in modern economies. Firms engaged in these activities are critical to economic growth. At the same time, the integration of STEM disciplines across nearly all industries is even more essential for productivity gains to ensure competitiveness. For example, in 2006, while more than 3,000 Maine workers were employed in the computer systems and design industry, there were more than 8,000 workers employed in computer and mathematics occupations across all industries.

There are many industries classified as STEM. Computer software firms, specialty chemical manufacturers, research and development laboratories, advanced electronics manufacturers, and designers of precision-built machinery all come to mind when we think of STEM industries. Refined industry classification can be challenging, however. Consider Interface Fabrics Group, Inc. This Guilford, Maine company is well known for its high-tech approach to carpet and synthetic fabric manufacturing, but the carpet and fabric manufacturing industry is not typically considered “high-tech.” Another shining example is Maine’s boat building industry, which utilizes STEM disciplines in the application of advanced manufacturing techniques and composite materials.

The Maine Office of Innovation and the Maine Technology Institute has identified seven technology clusters within the Maine economy: Biotechnology, Composites and Advanced Materials, Environmental Technology, Forest Products and Agriculture, Information Technology, Marine Technology and Aquaculture, and Precision Manufacturing.

These industries were analyzed for both their cluster strength (the relationship between firms) and their growth potential. The clusters linked to the traditional Maine economy—Forest Products and Agriculture and Marine Technology and Aquaculture—are identified as having very strong ties and cluster characteristics, but lower growth potential. Biotechnology, Composites and Advanced Materials, and Information Technology show large growth potential, but lack well-defined cluster relationships.

For this report, STEM industries are those identified as high-tech by the U.S. Department of Commerce,<sup>1</sup> with the addition of boat building due to its significance to Maine manufacturing. High-tech manufacturing; computer-related industries in the information sector; and professional and business services pertaining to science and engineering are included. As shown in Table 1, there was a substantial increase in the number of establishments in STEM industries (21%) and in the wages paid by such establishments (18%), while total employment in these industries remained relatively constant (-2%).

| <b>Table 1 – Establishments, Employment, and Wages<br/>in STEM Industries</b> |                       |                   |              |
|---|-----------------------|-------------------|--------------|
|   | <b>Establishments</b> | <b>Employment</b> | <b>Wages</b> |
| 2002  | 2,680                 | 36,970            | \$46,150     |
| 2006  | 3,230                 | 36,120            | \$54,390     |
| <i>Change</i>   | 21%                   | -2%               | 18%          |

<sup>1</sup> The U.S. Department of Commerce list includes chemical refineries and chemical manufacturing; weapons and ammunition manufacturing; machinery manufacturing; computer, semiconductor, and electronic equipment manufacturing; motor vehicle manufacturing; aerospace manufacturing; medical equipment and supplies manufacturing; software publishing; information systems and data processing; architectural, engineering, and related services; computer systems design and related services; management, scientific, and technical consulting services; scientific research and development services, educational support services; and computer and office machine repair and maintenance. For a full list, including NAICS codes, see Appendix.

This employment decline, albeit small, conflicts with other data that indicate employment growth in STEM occupations. The growth of STEM occupations is not however, limited to STEM industries, as these occupations are employed throughout the economy.

We can learn more about STEM industries when we separate them into manufacturing and nonmanufacturing. In nonmanufacturing STEM industries the average employment per establishment is six workers. For manufacturing STEM industries, the average employment per establishment is 67. Percentage growth, both in the number of establishments and total employment has been lower in manufacturing. Between 2002 and 2006 establishment growth in nonmanufacturing STEM industries was over 20 percent, with employment growth of 4.2 percent, as demonstrated in Table 2.

|                   |               | <b>Establishments</b> | <b>Employment</b> | <b>Wages</b> |
|-------------------|---------------|-----------------------|-------------------|--------------|
| Manufacturing     | 2002          | 330                   | 23,570            | \$46,440     |
|                   | 2006          | 360                   | 22,170            | \$54,700     |
|                   | <i>change</i> | 9.1%                  | -6.0%             | 17.8%        |
| Non-manufacturing | 2002          | 2,350                 | 13,390            | \$45,650     |
|                   | 2006          | 2,870                 | 13,960            | \$53,900     |
|                   | <i>change</i> | 22.4%                 | 4.2%              | 18.1%        |

## Defining STEM Occupations

Employment of STEM occupations is not limited specifically to STEM industries. These occupations are employed across a wide spectrum of economic activities and industries. Educational requirements vary, depending on the work. High-level research and development workers with advanced degrees work alongside technical support staff with postsecondary training beyond high-school up to and including a bachelor's degree. The science component of STEM focuses on the natural sciences (the life and physical sciences that focus on the living and nonliving parts of the natural world). This basic division holds for most occupational specialties in the natural sciences. However, the lines sometimes can be blurred. Biochemists may work with both organic and inorganic matter that is almost indistinguishable. Environmental scientists studying the effects of pollution and other health hazards must understand the relationship between living organisms and their environment.

Natural science technicians<sup>2</sup> have as many specialties as the natural scientists they assist. Typically, natural science technicians gather data by testing, experimentation, or investigation so that others can perform higher level analysis. Environmental science technicians, for example, work on-site or in laboratories to gather and test materials for environmental safety purposes, within established guidelines or under the direction of environmental scientists.

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<sup>2</sup> For purposes of this report, data for natural science technicians may be slightly influenced by the presence of a small number of social science technicians in the data set. This is due to limitations inherent to the Standard Occupational Classification (SOC) system.

The technology component of STEM is represented by workers who design computer applications, write programming code, or manage databases and networks. They also may research the nature of computer logic or provide support to computer users.

The engineering disciplines of STEM are those workers who develop, design, evaluate, test, and sometimes supervise others. For example, industrial engineers develop and evaluate manufacturing processes; electronics engineers may build and test circuits and sensors; and civil engineers design and supervise the construction of buildings, roads, railroads, bridges, dams, power plants, waste disposal systems, and similar structures. Drafters, engineering, and mapping technicians provide technical assistance in support of engineering projects. Drafters produce detailed technical drawings and diagrams based on engineering designs. Engineering technicians perform various technical and engineering tasks under the supervision of engineers. Mapping and surveying technicians assist in creating maps and compiling detailed information for construction projects and other uses.

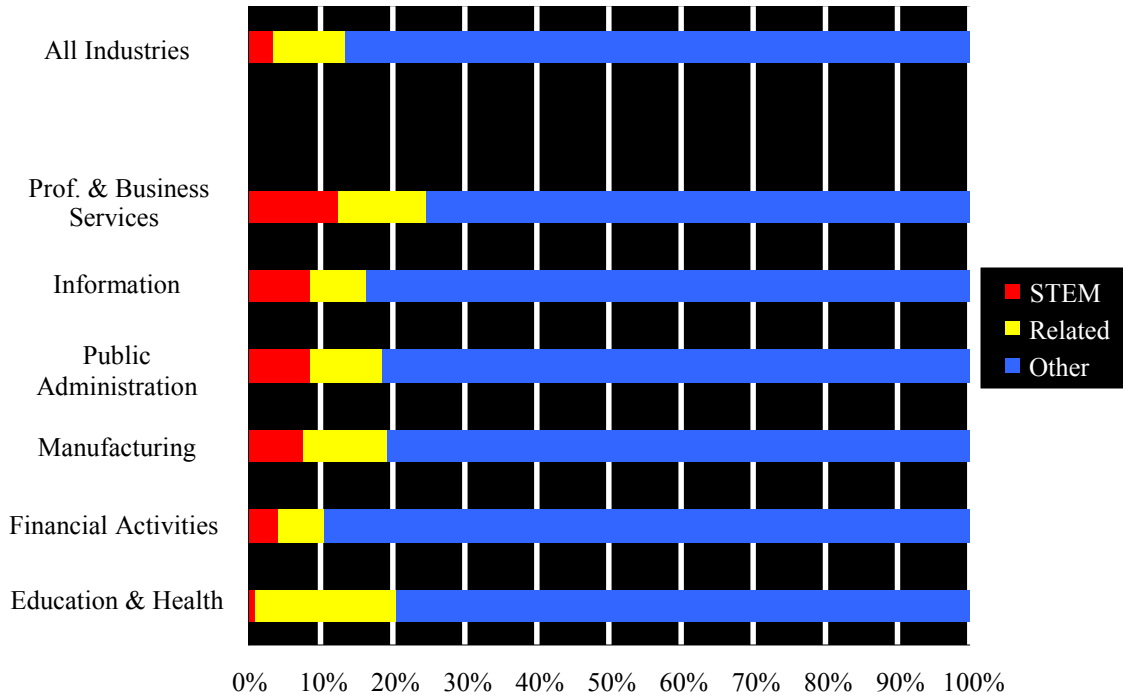
The mathematics component of STEM consists of mathematicians who specialize in numerical methods (such as algebra, calculus, or combinatorics) and statisticians who specialize in statistical methods. Actuaries analyze risk and operations research analysts develop mathematical models to evaluate real-world systems and problems. Mathematical technicians may assist mathematicians in their work.

It is worth noting that some occupations, such as managers of STEM workers, are typically not counted as STEM workers themselves. Postsecondary teachers in STEM fields are sometimes included; sometimes not (In this report they are not counted.) Also, healthcare occupations are not counted as STEM occupations, even though science and mathematics are integral to the knowledge base of doctors, medical laboratory technologists, and many other healthcare professionals.

There are many occupations at all levels of educational preparation that are closely linked to STEM in some way. For the purpose of this report, STEM-related occupations are defined by skill-set associations (for example, mathematicians are related to accountants, while biological technicians are related to medical laboratory technicians) or affiliated tasks (for example, managers of STEM workers or animal breeders are associated with agricultural scientists).

## Assessing Employment in STEM Occupations

**Chart 1 – Percentage of Employment:  
STEM, STEM-related, and Other**



Employment of STEM occupations in Maine is spread across many industries. Chart 1 shows the percentage of STEM, STEM-related, and other employment by industry sector. Table 3 shows STEM employment and annual salaries within industry sectors.

Professional and Business Services has the largest concentration of STEM occupations in Maine, represented by 12 percent of total employment in that sector. Additionally, one third of Maine's total STEM employment is in this sector. (see Table 3).

The Information sector has almost 1,000 STEM jobs, representing 9 percent of sector employment. This sector includes industries related to information in general and is, therefore, broader than simply computer-related industries. The Information sector is comprised of libraries, newspaper publishing, radio broadcasting, and telecommunication services. It should be noted that this percentage is not necessarily reflective of the significance of computer specialists within the Maine economy, as many of these workers are actually employed in other industry sectors.

Public Administration in Maine employs 3,840 STEM jobs, which is 19 percent of total STEM employment in Maine, and 9 percent of sector employment.

A quarter of total STEM employment in Maine is in Manufacturing, while STEM occupations comprise 8 percent of total employment in this sector. The average annual salary of STEM employees in manufacturing is \$58,020.

The Financial Activities sector pays the highest wages to those employed in STEM occupations, with an average annual salary of \$60,420. Four percent of Financial Activities employment is represented by STEM occupations, while seven percent of total STEM employment is in this sector.

**Table 3 – STEM Employment by Industry Sector, 2006**

|                                    | <b>STEM<br/>Employment<br/>in Sector</b> | <b><i>STEM as<br/>% of<br/>Total<br/>Sector</i></b> | <b><i>Sector as<br/>% of<br/>Total<br/>STEM</i></b> | <b>Average<br/>Annual<br/>Salary</b> |
|------------------------------------|--|---|---|--------------------------------------|
| Professional and Business Services | 6,450                                    | 12%   | 33%   | \$54,010                             |
| Information                        | 960                                      | 9%  | 5%  | \$58,290                             |
| Public Administration              | 3,840                                    | 9%  | 19%   | \$58,460                             |
| Manufacturing                      | 4,600                                    | 8%  | 23%   | \$58,020                             |
| Financial Activities               | 1,340                                    | 4%  | 7%  | \$60,420                             |
| Education and Health Services      | 1,470                                    | 1%  | 7%  | \$48,500                             |

In Maine in 2006, STEM employment was estimated at 19,840 jobs or 3.3 percent of total employment of 596,910. Nationally, STEM employment accounts for 6,093,000 jobs or 4.9 percent of total employment of 132,604,980.

Mathematics occupations account for 1.7 percent of STEM employment in Maine compared to 1.8 percent nationally. Staffing patterns for other STEM disciplines in Maine are however, quite different from those of the nation. Almost half (49 percent) of STEM employment nationally is in technology-related occupations, compared to 39 percent in Maine. Across all sectors, natural science represents a larger portion of STEM employment in Maine than nationally. In Maine, there are more engineering technicians (21.4 percent of STEM employment) than engineers (20.2 percent). Nationally, drafters and engineering technicians represent 13.2 percent of STEM employment and engineers, 23.6 percent.

**Table 4 – Employment Change by Industry Sector, 2002 to 2006 (Maine)**

|                                    | <b>STEM</b>       |               | <b>STEM-related</b> |               | <b>All Occupations</b> |               |
|------------------------------------|-------------------|---------------|---------------------|---------------|------------------------|---------------|
|                                    | <b>Net Change</b> | <b>Change</b> | <b>Net Change</b>   | <b>Change</b> | <b>Net Change</b>      | <b>Change</b> |
| Professional and Business Services | 170               | 2.7%          | 70                  | 1.1%          | 90                     | 0%            |
| Information                        | 40                | 4.3%          | 0                   | 0.0%          | -300                   | -2.6%         |
| Public Administration              | 310               | 8.8%          | 30                  | 0.7%          | -2,670                 | -5.6%         |
| Manufacturing                      | 980               | 27.1%         | -220                | -3.0%         | -6,050                 | -9.0%         |
| Financial Activities               | 110               | 8.9%          | -20                 | -1.0%         | -1,160                 | -3.4%         |
| Education and Health               | 640               | 77.1%         | 1,000               | 3.4%          | 7,300                  | 4.8%          |
| All Industries                     | 1,790             | 9.9%          | 1,980               | 3.4%          | 3,060                  | 0.5%          |

Between 2002 and 2006, growth in STEM and STEM-related occupations in Maine was comparatively strong. The strongest growth took place in Manufacturing, where almost a thousand jobs were created in STEM occupations, representing an increase of more than 27 percent. The Health and Education sector gained 640 jobs in STEM occupations (77 percent growth). In total, STEM occupations accounted for almost 1,800 jobs for an overall increase of 10 percent across all industry sectors. Total employment in STEM-related occupations also grew, offsetting declines experienced in the Manufacturing and Financial Activities sectors. Growth in STEM and STEM-related occupations was strong when compared to that of all occupations during this period.

Projected growth of STEM occupations in Maine lags that of the nation. Nationally, STEM employment through 2014 is projected to grow 22 percent (compared to 13.0 percent for all occupations). Employment of STEM occupations in Maine is projected to grow 7.5 percent (compared to 7.2 percent for all occupations). Employment in technology occupations in Maine is projected to grow 16.4 percent. Nationally, employment in technology occupations is projected to grow 31 percent during this period. In Maine, projected growth is 12.2 percent for life scientists and 12.1 percent for natural science technicians. Nationally, projected employment growth of these occupations is 21 and 14 percent, respectively.

**Table 5 – Employment Outlook for STEM Occupations, 2004 to 2014 (Maine)**

|  | Average Employment |              | Change in Employment |              | Average Annual Openings |
|--|--------------------|--------------|----------------------|--------------|-------------------------|
|  | 2004               | 2014         | Net                  | Percent      |                         |
| <b>Science Occupations, Natural</b>                  | <b>3,458</b>       | <b>3,777</b> | <b>319</b>           | <b>9.2%</b>  | <b>102</b>              |
| Life Scientists                                      | 952                | 1,068        | 116                  | 12.2%        | 34                      |
| Physical Scientists                                  | 1,099              | 1,132        | 33                   | 3.0%         | 28                      |
| Natural Science Technicians                          | 1,407              | 1,577        | 170                  | 12.1%        | 42                      |
| <b>Technology Occupations (Computer Specialists)</b> | <b>7,090</b>       | <b>8,254</b> | <b>1,164</b>         | <b>16.4%</b> | <b>218</b>              |
| Programmers and Software Engineers                   | 2,161              | 2,390        | 229                  | 10.6%        | 68                      |
| Analysts and Computer Support                        | 4,929              | 5,864        | 935                  | 19.0%        | 150                     |
| <b>Engineering Occupations</b>                       | <b>8,785</b>       | <b>8,762</b> | <b>-23</b>           | <b>-0.3%</b> | <b>239</b>              |
| Engineers  | 4,367              | 4,465        | 98                   | 2.2%         | 117                     |
| Drafters, Engineering and Mapping Technicians        | 4,418              | 4,297        | -121                 | -2.7%        | 122                     |
| <b>Mathematics Occupations</b>                       | <b>404</b>         | <b>417</b>   | <b>13</b>            | <b>3.2%</b>  | <b>16</b>               |
| STEM Occupations, Total                              | 19,737             | 21,210       | 1,473                | 7.5%         | 575                     |
| All Occupations, Total                               | 668,728            | 717,100      | 48,372               | 7.2%         | 21,759                  |

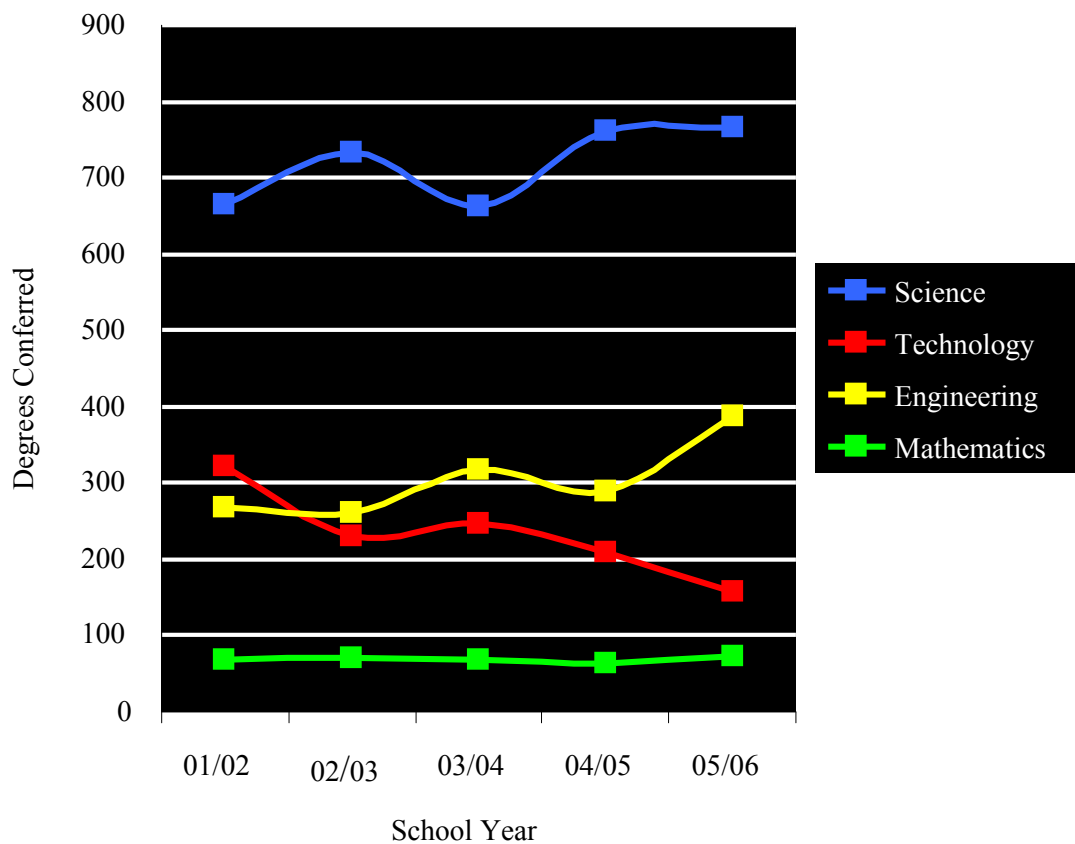
Among STEM occupations, growth is projected across all disciplines except Engineering Occupations. While engineers are projected to gain 98 jobs (2.2 percent), drafters, engineering, and mapping technicians are projected to decline by 121 (-2.7 percent) between 2004 and 2014. It should be noted that in Maine the staffing mix of engineers and technicians is about equal. Nationally the staffing mix is about half as many technicians as engineers. Wages of drafters and engineering technicians in Maine are nearly equal to the national average, while average wages of all occupations in Maine fall 10.3 percent below the 2006 national average. It is conceivable that the greater relative cost of employing engineering technicians and drafters will impact the growth of these occupations in Maine. More likely however, is that the projected decline of this occupational group is related to structural changes occurring in industries where employment of the group is concentrated. Job openings for drafters, engineering, and mapping technicians will exist primarily to meet replacement demand rather than

growth, with 122 projected annually during the 2004-2014 period. Average annual openings for all STEM occupations are estimated at 575.

Between the 2002 and 2006 academic years, colleges and universities in Maine conferred an average of 1,324 degrees (at all levels, from associate to doctoral) per year in STEM disciplines. The largest number of these degrees was in science (717 per year, on average). In mathematics, the number of degrees conferred per year has remained relatively constant at around 69, while the number of degrees conferred in science and engineering (about 305 per year) seems to be trending slightly upward. However, there has been a decline in the number of computer-related degrees conferred (323 in 2002 and 157 in 2006). This phenomenon is not unique to Maine; it is a national trend. The number of students increased dramatically in the late 1990s, but the spike in enrollment and degrees conferred decreased after the dot-com collapse.

It is important to note that many who graduate with STEM degrees do not pursue careers in STEM occupations. For example, many who pursue medicine study biology or chemistry as undergraduates and many who become teachers earn degrees in mathematics and science.

**Chart 2 – Degrees Conferred in STEM Disciplines  
At Maine Colleges and Universities**

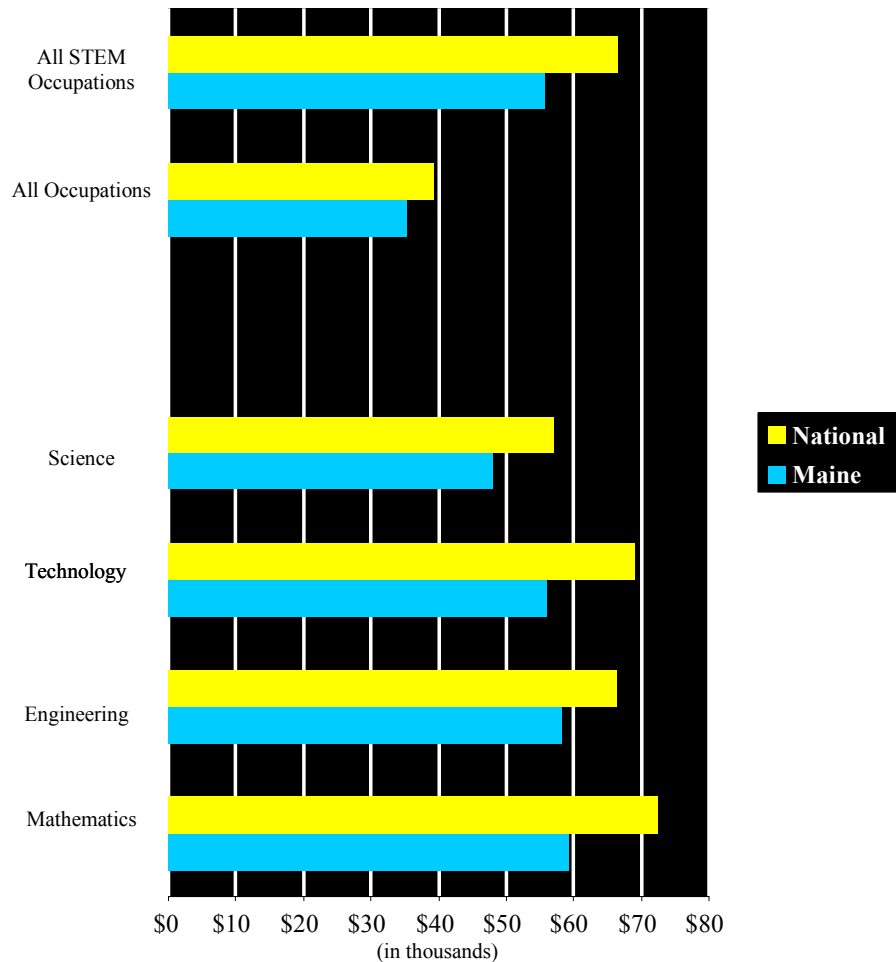




## Wages of STEM Occupations

In Maine, \$55,690 is the average annual wage of STEM occupations. This is 58 percent higher than the average annual wage of all Maine occupations, but approximately 17 percent lower than the average annual wage (\$66,700) of STEM occupations nationwide. Charts 3 and 4 compare the average annual salaries of STEM occupations in Maine to national averages.

**Chart 3 – Average Annual Salaries in STEM Occupations (Broad Disciplines), Maine and National, 2006**

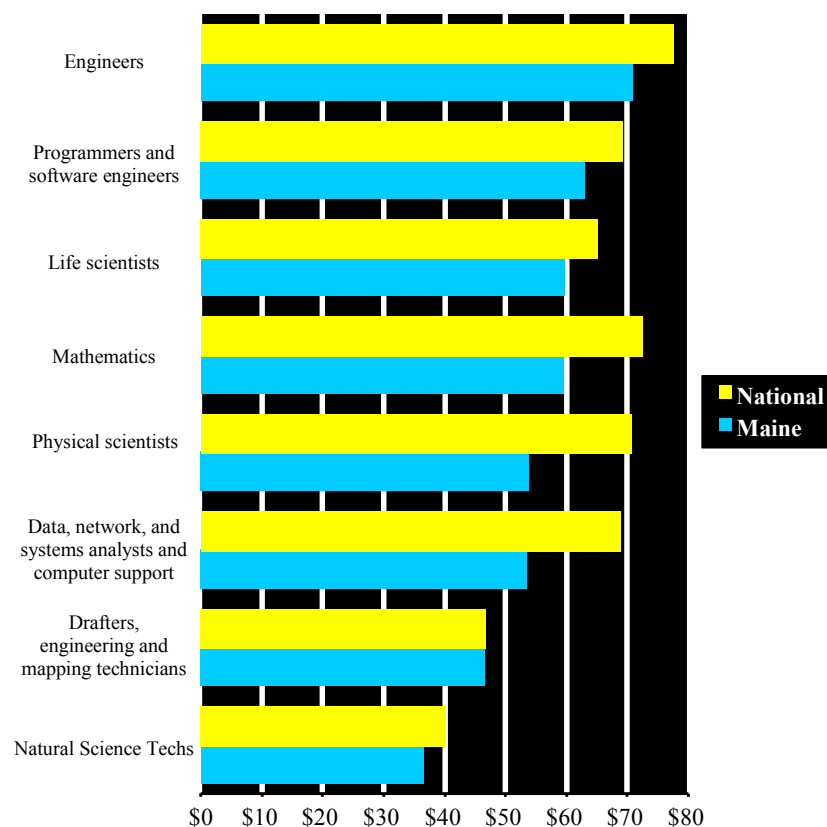


Among the STEM occupations, average wages of the science disciplines vary the most between Maine and the nation. Life scientists earn an average annual wage of \$59,720, which is 70 percent higher than the average wage for all occupations in Maine. It is however, eight percent below the national average for such occupations. Nationally, the average wage for life scientists is 66 percent higher than the average wage for all occupations. Thus, relative to the general population, life scientists are paid higher in Maine than nationwide. Conversely, physical scientists, with an average annual salary of \$53,900, are paid 53 percent more than the average for all occupations in Maine, while nationally physical scientists make 80 percent more than the average salary for all occupations. It is worth noting that some of the industries where physical scientists earn comparatively high wages nationally employ very few if any in Maine. For example, the average annual wage of geoscientists in oil

and gas extraction and mining industries is more than \$100,000, but these industries are not prevalent in Maine. Natural science technicians employed in Maine earn an average annual salary of \$36,620, which is 4.2 percent above the average of all Maine occupations. Nationally, natural science technicians earn 2.7 percent above the average for all occupations.

The mean earnings of technology occupations in Maine are \$56,170 per year, which is 60 percent higher than the average of all Maine occupations. Average earnings of these workers nationally is \$69,120 per year, or 76 percent above the national average for all occupations. In Maine, there is a disparity between the wages of programmers and software developers versus those of analysts and computer support professionals. On average, programmers and developers earn \$62,970 per year (79 percent more than the statewide average), and analysts earn \$53,550 per year (52.3 percent more than the average).

**Chart 4 – Average Annual Salaries in STEM Occupations, Maine and National, 2006**



Mean earnings of engineers in Maine are \$70,840 per year, or 101 percent above the average of all Maine occupations. Nationally, mean earnings of engineers are 98 percent above that of all occupations combined. Earnings of drafters and engineering technicians in Maine were \$46,540, comparing favorably to the \$46,790 national average. When viewed in combination with the 8.6 percent gap between engineer salaries in Maine versus the nation, it can be said that average earnings of engineering occupations are closer to the national average than other STEM occupations.

Average earnings of Maine workers employed in mathematics occupations were \$59,430 compared to the national average of \$72,440 for this occupational group. Mathematics occupations represent the second-highest paid class of STEM workers behind engineers, at both the state and national levels. The wage ratio of Maine's mathematics workers to the national average is 82 percent, and slightly below the 83.5 percent ratio existing for all STEM occupations.

**Table 6 – Wages of STEM and Related Occupations, 2006**

|                                   | STEM, Maine | Related, Maine | STEM, National |
|-----------------------------------|-------------|----------------|----------------|
| Science                           | \$48,010    | \$48,440       | \$57,190       |
| Technology (Computer Specialists) | \$56,170    | \$58,890       | \$69,120       |
| Engineering                       | \$58,340    | \$42,270       | \$66,520       |
| Mathematics                       | \$59,430    | \$55,470       | \$72,440       |
| All Disciplines                   | \$55,690    | \$48,620       | \$66,700       |

## Summary and Conclusions

Modern economies depend on innovation to stimulate growth and create new jobs. Critical to economic innovation are concentrated investments in research and development, rapid prototyping, and effective movement to commercialization. However, human capital and the availability of talent also are significant drivers. While science and technology industries are most often the symbols of this innovation, business and industry in general are moving toward a greater incorporation of science and technology. As a result, STEM-related occupations are integral to successful economies as well.

Much of what we do as a society depends on the successful application and integration of a variety of complex systems and technologies. Just as important as the scientists and engineers who develop such systems and technologies are the growing number of workers who apply these systems and technologies to all aspects of our everyday lives. Going forward, higher-order scientific, technical, and mathematical knowledge and skills will be needed by more Maine workers.

STEM occupations are high-skilled jobs that typically require higher education. Postsecondary training beyond high school or an associate degree will suffice some entry-level technical positions, but for the most part a bachelor's, master's, or professional-level degree is required.

There are positive indications for STEM occupations in Maine. The average wage for STEM occupations is higher than the average of all occupations, both locally and nationally. In Maine, the average STEM wage is 58 percent higher than the average wage for all occupations (while, nationally, the average STEM wage is 70 percent higher). Additionally, projected job growth in STEM occupations in Maine is higher than the statewide average. The outlook for STEM occupations in Maine is promising. We must now ensure that we educate, train and prepare Maine's workforce in requisite numbers and with advanced knowledge, skills and abilities to meet future demand.

## Appendix of STEM Industries

High technology industries, as defined by the U.S. Department of Commerce:

### NAICS Code Industry

|        |  |
|--------|--|
| 32411  | Petroleum Refineries   |
| 3251   | Basic Chemical Manufacturing   |
| 3252   | Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing |
| 3253   | Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing                     |
| 3254   | Pharmaceutical and Medicine Manufacturing  |
| 3255   | Paint, Coating, and Adhesive Manufacturing   |
| 3256   | Soap, Cleaning Compound, and Toilet Preparation Manufacturing                            |
| 3259   | Other Chemical Product Manufacturing   |
| 332992 | Ordinance & Accessories Manufacturing – Small Arms Ammunition Manufacturing              |
| 332993 | Ordinance & Accessories Manufacturing – Ammunition (except Small Arms) Manufacturing     |
| 332994 | Ordinance & Accessories Manufacturing – Small Arms Manufacturing                         |
| 332995 | Ordinance & Accessories Manufacturing – Other Ordinance and Accessories Manufacturing    |
| 3331   | Agriculture, Construction, and Mining Machinery Manufacturing                            |
| 3332   | Industrial Machinery Manufacturing   |
| 3333   | Commercial and Service Industry Machinery Manufacturing                                  |
| 3336   | Engine, Turbine, and Power Transmission Equipment Manufacturing                          |
| 3339   | Other General Purpose Machinery Manufacturing  |
| 3341   | Computer and Peripheral Equipment Manufacturing  |
| 3342   | Communications Equipment Manufacturing   |
| 3343   | Audio and Visual Equipment Manufacturing   |
| 3344   | Semiconductor and Other Electrical Equipment Manufacturing                               |
| 3345   | Navigational, Measuring, Electromedical, and Control Instruments Manufacturing           |
| 3346   | Manufacturing and Reproducing Magnetic and Optical Media                                 |
| 3353   | Electrical Equipment Manufacturing   |
| 33599  | All Other Electrical Equipment and Component Manufacturing                               |
| 3361   | Motor Vehicle Manufacturing  |
| 3362   | Motor Vehicle Body and Trailer Manufacturing   |
| 3363   | Motor Vehicle Parts Manufacturing  |
| 3364   | Aerospace Product and Parts Manufacturing  |
| 3391   | Medical Equipment and Supplies Manufacturing   |
| 5112   | Software Publishers  |
| 514191 | On-Line Information Services   |
| 5142   | Data Processing Services   |
| 5413   | Architectural, Engineering, and Related Services   |
| 5415   | Computer Systems Design and Related Services   |
| 5416   | Management, Scientific, and Technical Consulting Services                                |
| 5417   | Scientific Research and Development Services   |
| 6117   | Education Support Services   |
| 811212 | Computer and Office Machine Repair and Maintenance                                       |

## Appendix of STEM Occupations

### Natural Science Occupations:

#### Life Science Occupations:

- Animal Scientists – research animals for agricultural use
- Food Scientists – improve flavor, safety, preservation, and distribution of foods
- Soil and Plant Scientists – study soils, fertilizers, and plant growth
- Biochemists and Biophysicists – examine the physical properties of living organisms at the cellular level
- Microbiologists – study microscopic living organisms, such as bacteria, viruses, and plankton
- Zoologists and Wildlife Biologists – study the genetics, behavior, or life processes of larger plants and animals
- Conservation Scientists – study ways to ensure welfare and sustainability of natural resources
- Foresters – study the utilization of forests for recreational, industrial, and environmental purposes
- Epidemiologists – study the causes, spread, prevention, and cures of diseases
- Medical Scientists, except Epidemiologists – conduct research to improve human health

#### Physical Science Occupations:

- Astronomers
- Physicists
- Atmospheric and Space Scientists – study the earthly sky for meteorological conditions and develop weather forecasts
- Chemists
- Materials Scientists – analyze, develop, and improve materials
- Environmental Scientists and Specialists, Including Health – study the effects of pollution and other hazards to health and the environment
- Geologists – study the nature of the Earth and soil, perhaps investigating earthquakes or exploring for oil
- Hydrologists – study water flows, both of underground aquifers and surface water

#### Natural Science Technicians:

- Natural Science Technicians – assist Life and Physical scientists in research, conduct laboratory tests, or supervise relevant laborers in the field. Specialties include: agricultural and food science technicians, biological technicians, chemical technicians, geological and petroleum technicians, nuclear technicians, environmental science and protection technicians, forensic science technicians, forest and conservation technicians.

#### Technology Occupations (Computer Specialists):

##### Programmers and Software Engineers:

- Computer and Information Scientists – study computers and data in abstract ways from logic to efficient algorithms
- Computer Software Engineers – design systems software or applications
- Computer Programmers – translate the ideas of computer software engineers into code

##### Data, Network, and Systems Analysts and Computer Support:

- Network and Computer Systems Administrators – manage computer networks
- Network Systems and Data Communications Analysts – webmasters and also those who design data sharing systems
- Database Administrators – build, maintain, and secure structures for record keeping, research, and data mining
- Computer Support Specialists

#### Engineering Occupations:

##### Engineers:

- Civil Engineers – design structures from bridges to traffic management to public water and sewer layouts
- Electrical Engineers – design improve, and maintain electrical distribution systems
- Electronics Engineers
- Computer Hardware Engineers
- Mechanical Engineers – design mechanically based tools and equipment
- Industrial Engineers – design industrial production systems
- Materials Engineers – determine uses for materials or improve manufacture of materials
- Chemical Engineers – improve chemical manufacture
- Agricultural Engineers – design systems to grow and distribute foods
- Nuclear Engineers
- Aerospace Engineers
- Health and Safety Engineers

- Biomedical Engineers – design products related to health or improve systems related to healthcare and health information
- Environmental Engineers – apply engineering to public health hazards and ecological and geological problems
- Naval Architects and Marine Engineers – design ships and ship components
- Mining and Geological Engineers – also, mining safety engineers
- Petroleum Engineers – distribution and extraction of oil and gas

**Drafter and Engineering and Mapping Technicians:**

- Drafters – produce technical drawings. Specialties include: architectural and civil drafters, electrical and electronics drafters, mechanical drafters.
- Engineering Technicians – assist associated engineers. Specialties include: aerospace engineering and operations technicians, civil engineering technicians, electrical and electronic engineering technicians, electro-mechanical technicians, environmental engineering technicians, industrial engineering technicians, mechanical engineering technicians
- Surveying and Mapping Technicians

**Mathematics Occupations:**

- Mathematicians
- Statisticians
- Actuaries – analyze risk
- Operations Research Analysts – build mathematical models to improve systems and operations
- Mathematical Technicians