

Emerging Industries in the United States

December 2018

In the following report, Hanover Research identifies rapidly-emerging industries that can be considered for programmatic development or expansion. The report focuses on both national- and state-level (Missouri) trends, and also examines emerging technologies in the workforce.

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Recommendations

Based on an analysis of emerging industries and trends across the United States and in Missouri, Hanover recommends:

- 1 Consider developing or expanding academic programming in biosciences, energy solutions, health sciences, and information technology.

Institutions may consider offering unique or distinctive programs such as degrees in human genetics, energy management, community health promotion, and artificial intelligence. Most exemplar programs require a set of core courses, as well as elective courses, capstone experiences, and/or internships or fieldwork.

- 2 Form partnerships or internship programs with relevant companies and organizations.

As occupations in these emerging industries often require a combination of education and work experience, institutions can ensure graduates are well-equipped for the labor market by facilitating work or internship programs.

Fast Facts



4

Number of emerging industries highlighted in this report



\$73,643

Average annual wage for information technology workers in Missouri (2017)



6

Number of sectors commonly classified under the energy solutions industry

Key Findings

There are several broad emerging industries in the United States and in Missouri that present programmatic opportunities:

- ✓ Biosciences
- ✓ Energy Solutions
- ✓ Health Sciences and Services
- ✓ Information Technology

There appears to be a geographic concentration of associated jobs in these emerging industries.

Employment in the selected industries is highly concentrated in the Far West, as well as in the New England and Mid-Atlantic regions. The states of Texas and Florida also have a high concentration of workers in the related industries.

Research on emerging industries consistently emphasizes how increasingly sophisticated technology will affect future employment.

The greater sophistication possible means that a sizable percentage of current occupations will be replaced by technology in the near future. As many occupations will experience significant job loss and will require fewer manual laborers, soft skills will be critical to jobs of the future, and development of these skills should be emphasized in academic programs.

Technological advances represent opportunities for higher education to anticipate future needs of students and the labor market.

As jobs will exist at the intersection of technology and broad skill sets, disciplines should seek to integrate advanced technological content through programs such as creative computing. Institutions should also consider investing in centers for artificial intelligence or virtual reality, as these are set to be important areas of technological growth in coming years.

Overview and Research Questions

Emerging Industries in the United States



Overview

In order to assist institutions in developing or expanding cutting-edge programs, Hanover Research (Hanover) conducted an assessment to identify emerging industries or trends for eventual programmatic expansion. The report focuses on both national and state-level trends, examining how emerging industries will affect the future workforce and create need for new higher education programs.

The following analysis is based on a review of information drawn from secondary literature, i.e., publicly available reports and sources. The analysis includes a review of secondary data and literature relevant to the topic, and identifies exemplar programs that illustrate how higher education can meet emerging industry needs.

Research Questions



What fields and industries are most likely to develop with the United States in the next 10 years?



How will these emerging industries/trends affect the future workforce and create need for new higher education programs to fill workforce or knowledge gaps?



Where are these industries emerging first? Is there a geographic concentration of associated jobs and programs?

EMERGING TECHNOLOGIES IN THE WORKFORCE

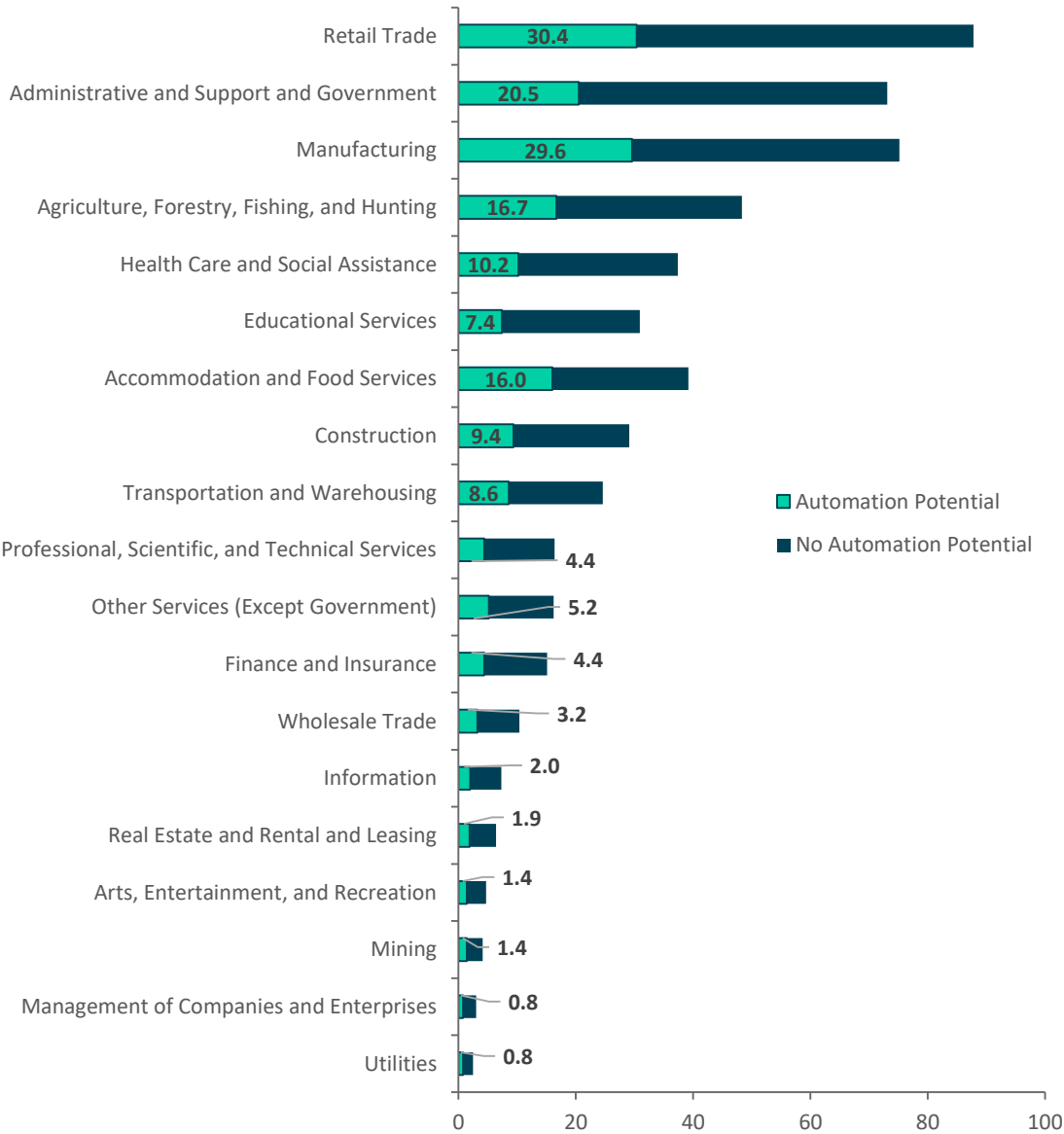
Technology's Effect on Employment

Research on emerging industries consistently emphasizes how increasingly sophisticated technology will affect future employment.

The increased use of technology has far-reaching implications across many fields. Greater sophistication in areas such as artificial intelligence, robotics, and automation means that a sizable percentage of current occupations will be replaced by technology in the near future ([Pew Research Center](#)).

With increasing digitization, there is a great risk of job loss to automation. The figure on the right displays results of [McKinsey](#)'s analysis of the impact of automation in the Americas. Some industries will feel the effects more strongly than others. For example, in the *Manufacturing* and *Accommodation and Food Services* sectors, 65 percent and 69 percent (respectively) of work has the potential to be automated. The average automatability for knowledge-intensive industries is slightly lower. However, it is likely that greater levels of automation will be employed across all industries in the future.

Potential Jobs Lost Due to Automation (in millions)



Importance of Digital Fluency and Soft Skills

Automation will lead to a greater emphasis on digital fluency and soft skills.

In the coming years, it will be increasingly important for workers across all industries to develop some level of [digital fluency](#), or the ability to “select and leverage appropriate tools and technology to learn, work, and communicate.” As the majority of work across all industries requires technology, students must be prepared to use it effectively.

[Research](#) further notes that given increasing technology and automation, firms no longer rely solely on employee’s technical expertise. Therefore, “the factor differentiating these organizations from struggling competitors is the employee’s soft skills.” [Soft skills](#) may include characteristics such as adaptability, collaboration, organization, and empathy, all of which are vital to succeed in today’s competitive workforce. Development of these skills should be emphasized in academic programs.

Virtual, Augmented, and Mixed Reality

Augmented reality and virtual reality are other technologies that will likely enhance a broad range of industries in the future.

A recent technology trends report published by [Deloitte](#) indicates that such industries include education, operations, communication and collaboration, marketing and customer service, and shopping. According to Deloitte, both augmented reality (AR) and virtual reality (VR) systems will dramatically change how industries function.

Together, AR and VR represent the field of “mixed reality” (MR), which offers a variety of process improvements and untapped potential. How AR and VR will be used in the future is still largely unknown, although recent software infrastructure improvements by [Apple](#) and [Google](#) are likely to speed adoption of these technologies.

Implications for Program Expansion

These trends represent opportunities for higher education to anticipate future needs of students and the labor market.

Given the significance of increasingly sophisticated technologies, staying at the forefront of these technological areas will be important to stay relevant. As such, many colleges and universities are positioning themselves as locations for innovation in these areas. Schools and colleges of engineering and computer science, in particular, are home to institutes and incubators that encourage development in artificial intelligence, robotics, and innovation ([University Incubation Connection](#), [CNBC](#)).

Mixed reality has potentially broad applications, including use in education.

Application possibilities in education can include augmenting lesson plans through placing students in an immersive environment, or allowing remote students to more fully participate in the classroom experience. Several institutions are already utilizing this technology to amplify learning. The [University of Michigan at Ann Arbor](#), for example, has a 3D lab that includes 3D visualization services, helping students and faculty develop simulated 3D environments for research or learning.

Jobs will exist at the intersection of technology and broad skill sets.

As academic programs within the humanities or liberal arts develop “soft” skills, such as critical thinking, training students in technological tools can further enhance their backgrounds. One such area that can combine these seemingly disparate fields is *creative computing*, an interdisciplinary program combining arts, engineering, and computer science.

Southern Methodist University’s [Meadows School of the Arts](#) offers one such program that uses technology as a “powerful medium to create 2D and 3D works of art, augmented performance, intelligent physical spaces, and real-time interactivity.” Students participate in internships that unite computing with design or art, providing practical experience and often leading to post-graduation employment.

EMERGING INDUSTRIES

Target Industries

The Missouri Department of Economic Development has refocused its resources to specifically target companies in select sectors.

The figure on the right presents several sectors that may be aligned with academic programs: biosciences; energy solutions; health sciences and services; and information technology. These four sectors appear to be emerging quickly in the United States as a whole, and will be further explored at the national and state levels in the rest of the report.

Missouri Industry Concentration

A 2016 [Missouri Industry Brief](#) further notes which industries in Missouri are particularly concentrated.

Understanding highly concentrated industries in Missouri can serve as a proxy for understanding the state's economic basis. The following highly concentrated industries are those with 5,000 or more workers and Location Quotient* scores greater than 1.20. Overall, Missouri's economy shows that manufacturing and services industries are particularly strong:

- ✓ Machinery Manufacturing
- ✓ Transportation Equipment
- ✓ Electrical Equipment and Appliance Manufacturing
- ✓ Telecommunications
- ✓ Food Manufacturing
- ✓ Administrative Support Services
- ✓ Data Processing, Hosting, and Related Services
- ✓ Electronic Markets, Agents, and Brokers

*Location Quotient is an indicator of measuring industry concentration. It is a ratio of the relative distribution of industry employment in a region to that industry's distribution in a larger economy. For example, an LQ of 2.0 in a certain industry indicates that the industry's share of the state economy is twice as large as its share of the national economy.

BIOSCIENCES

- Missouri is home to the largest concentration of animal health research and food companies as well as the most plant scientists per capita.

ENERGY SOLUTIONS

- The energy production and storage businesses are thriving due to Missouri's high-tech environment, natural resources, and central location.

HEALTH SCIENCES AND SERVICES

- Many of the nation's leaders in electronic healthcare management as well as health sciences research are in Missouri.

INFORMATION TECHNOLOGY

- Missouri is home to many of the fastest-growing tech companies (e.g., World Wide Tech, Square)
- Many household names have data centers in the state (e.g., AT&T, Enterprise, Walmart, MasterCard).

Source: Text reproduced nearly verbatim from [Missouri Department of Economic Development](#)

Emerging Industries

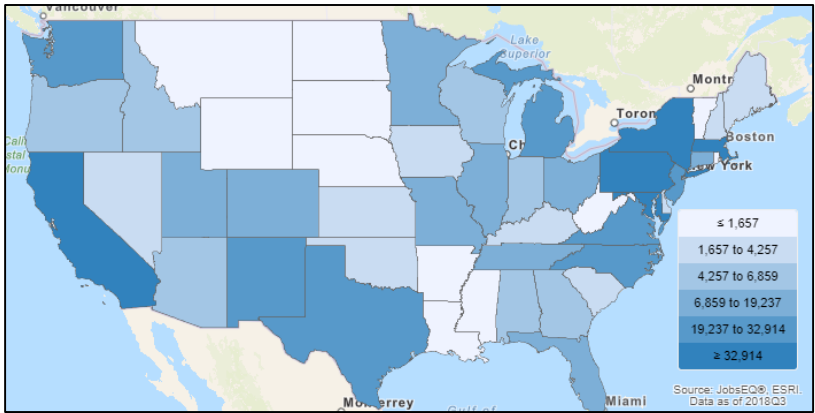
Emerging Industries in the United States

Emerging Industry Concentration

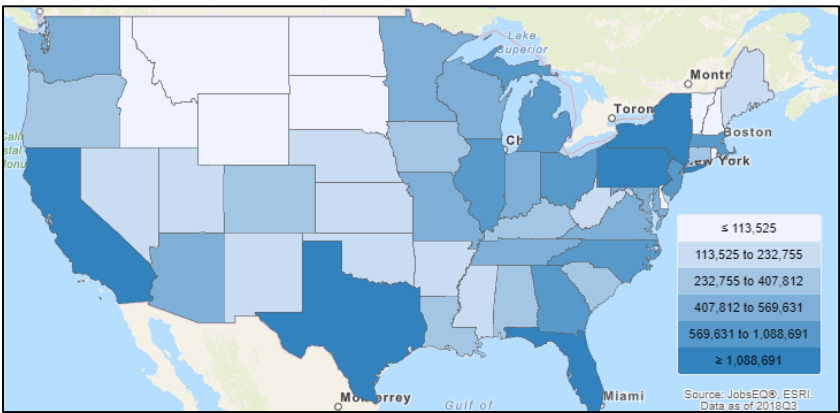
Jobs associated with emerging industries are geographically concentrated.

The figures below depict employment concentration in industries closely related to the emerging industries highlighted in this report. As can be seen below, industry employment for fields related to the biosciences, energy solutions, health sciences and services, and information technology is highly concentrated in the Far West (e.g., California) and in the New England and Mid-Atlantic regions. Texas and Florida also have a high concentration of workers in the related industries.

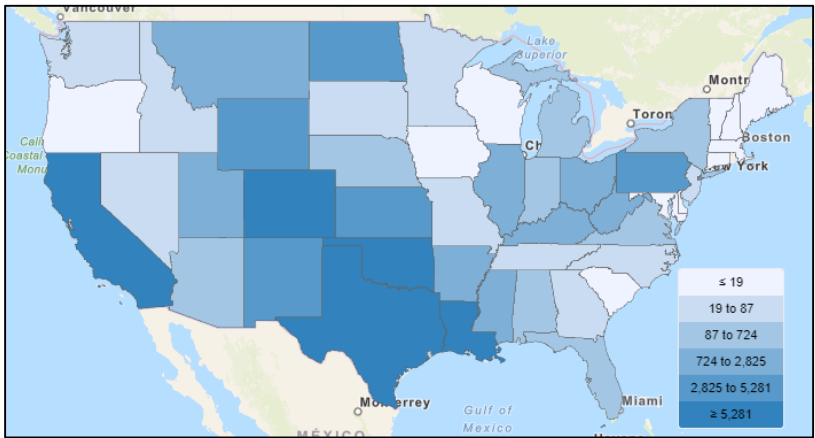
Industry Employment in Research and Development in the Physical, Engineering, and Life Sciences



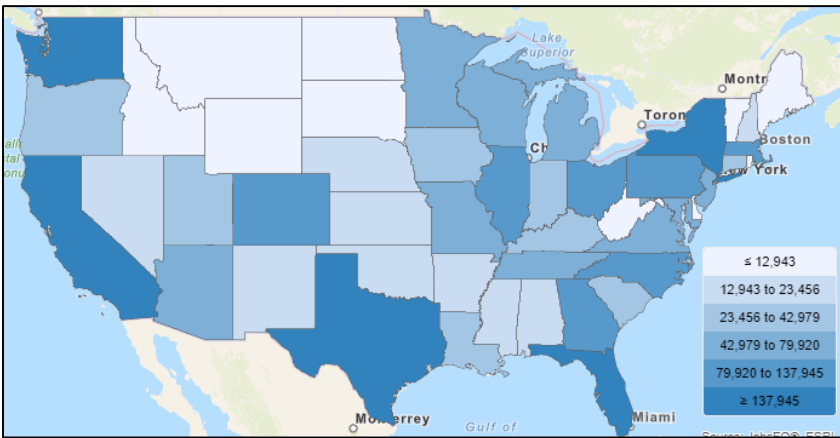
Industry Employment in Healthcare and Social Assistance



Industry Employment in Oil and Gas Extraction



Industry Employment in Information Services



EMERGING INDUSTRY CONCENTRATION: BIOSCIENCES

Industry Overview: Biosciences

Emerging Industries in the United States

National Outlook

The [Biotechnology Industry Organization](#) describes the biosciences industry as “one of the most innovative and important economic drivers in the United States,” requiring a highly-skilled workforce.

The Organization notes that biosciences jobs pay, on average, 79 percent more than the average workers in the country’s private sector. Currently, the United States serves as the leader of innovation and growth in this industry. However, in recent years, global competition has rapidly increased, pointing to the importance of focusing on this industry in the coming years.

A 2018 [Deloitte](#) report on global life sciences/biosciences notes that the industry is expected to grow significantly, and will be tied to rapidly-changing technology.

Growth in the biosciences industry may be due to a number of factors, including aging and increasing populations, emerging market expansion, advances in medical treatments, and rising labor costs.

In the coming years, it will be important to “embrace exponential changes in technology,” including artificial intelligence (AI), cognitive technologies, automation, and computing power. These technologies are creating new roles in the life sciences (e.g., Chief Data Officers) and increase the speed, scale, complexity, and security of biosciences operations.

Key Companies/Organizations in the U.S.

Most of the major national biosciences company headquarters are concentrated in the Northeast (i.e., Massachusetts, New Jersey, New York) or in California:


- Amgen (Thousand Oaks, CA)
- Biogen (Cambridge, MA)
- Celgene (Summit, NJ)
- Gilead Sciences (Foster City, CA)
- Johnson & Johnson (New Brunswick, NJ)
- Merck & Co. (Kenilworth, NJ)
- Pfizer (New York, NY)
- Regeneron Pharmaceuticals (Tarrytown, NY)
- Shire (Lexington, MA)
- Vertex Pharmaceuticals (Boston, MA)

Source: [Genetic Engineering and Biotechnology News](#), [Proclinical](#), [Investopedia](#)


Major Industry Sectors

The biosciences industry spans several different markets, and includes activities related to manufacturing, services, and research.


All sectors share a common goal of “applying knowledge of the way in which plants, animals, and humans function with the goal of developing new treatments, therapies, and processes.” The five major sectors of the biosciences industry are summarized below, and reflect the size and diversity of the overall industry.

**Agricultural Feedstock and Chemicals**


- Focuses on producing products involved in crop protection, agricultural processing, bio-fuels, etc.

**Drugs and Pharmaceutical**


- Focuses on producing vaccines, pharmaceuticals, tissue, and cell culture media.

**Medical Devices and Equipment**

- Focuses on producing biomedical products, such as surgical instruments, orthopedic implants, bioimaging equipment, dental instruments, and patient care products.

**Research, Testing, and Medical Laboratories**

- Focuses on drug discovery and delivery systems, gene and cell therapies, pre-clinical drug development, clinical trials, and research/laboratory support services.

**Bioscience-Related Distribution**

- Focuses on medical equipment and device distribution, drug distribution, and agricultural-related chemicals and seeds distribution.

Source: [Biotechnology Industry Organization](#)

Industry Overview: Biosciences

Emerging Industries in the United States

State Outlook

The biosciences sector, one of Missouri’s primary target sectors, comprises 13 separate industries.

Specific industries that may be beneficial to target include those that typically require at least a bachelor’s-level education for entry, such as the following:

- ✓ Scientific Research and Development Services
- ✓ Other Professional and Technical Services
- ✓ Medical and Diagnostic Laboratories

Overall, the biosciences sector represents 2.4 percent of total private sector employment in Missouri, and employees in the industry earn an average annual wage that is nearly \$11,600 more than the state’s private sector average annual wage of \$47,800.

There are a variety of occupations in the biosciences industry, including some that require long-term training: *Veterinarians*, *Market Research Analysts and Marketing Specialists*, and *General Operations Managers*. Occupations requiring more moderate levels of training include *Veterinary Technologists and Technicians* and *Phlebotomists*.

Fast Facts



56,038

Number of biosciences workers in Missouri (2017)



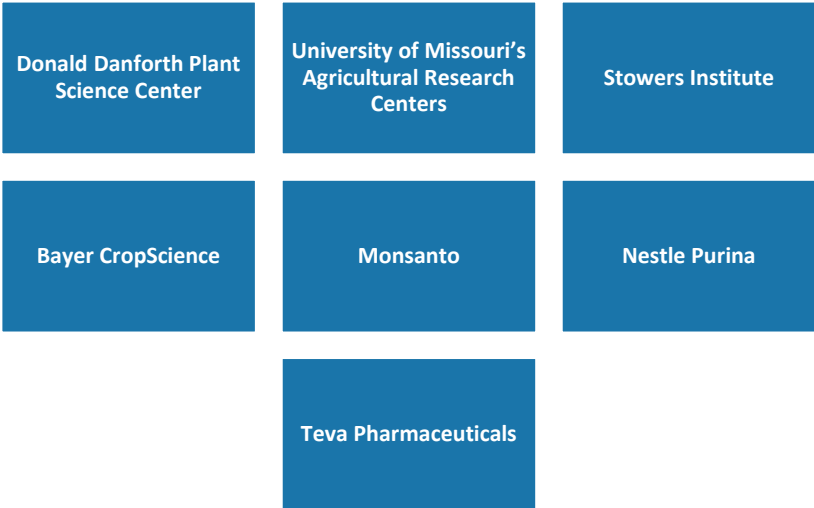
\$59,400

Average annual wage for bioscience workers in Missouri (2017)

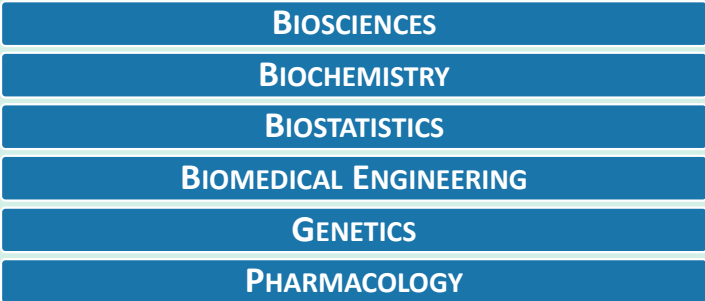
Source: [Missouri Department of Economic Development](#)

Key Companies/Organizations in Missouri

Biosciences research and development efforts are supported by several public and private organizations in the state:



Related Higher Education Programs



Source: [IPEDS](#)

Program Overview

University of Pittsburgh’s Graduate School of Public Health offers various undergraduate- and graduate-level degrees, including a Master of Science in Human Genetics.

The program includes a flexible curriculum that “provides a broad background in the field, while allowing customized emphasis on laboratory genetics or genetic data analysis.” Students complete core coursework, advanced classes in a specific concentration area, mentored research projects, and a final thesis project.

The program prepares students for careers in academia or in industry. Many graduates ultimately pursue PhD-level study and become independent scientists, while others pursue work on genetics and genomics research teams.

Curriculum Schedule

Students complete coursework during the first year of the program, though advanced courses may also be taken in the second year. Students must take both the core Human Genetics courses as well as the core Public Health curriculum:

M.S. in Human Genetics	
Fall Semester	Spring Semester
<ul style="list-style-type: none">Human Population GeneticsMolecular Basis of Human Hereditary DiseaseBioinformatic Resources of GeneticistsHuman Genetics SeminarDean’s Public Health Grand RoundsResearch EthicsIntroduction to Statistical MethodsPrinciples of Epidemiology	<ul style="list-style-type: none">Chromosomes and Human DiseaseBiochemical and Molecular Genetics of Complex DiseaseHuman Genetics Journal Club and Peer ReviewHuman Genetics SeminarDean’s Public Health Grand RoundsEssentials of Public Health

Source: [University of Pittsburgh](#)

Program Mission

- ✓ To promote the scientific progress of genetics as a field of study;
- ✓ To advance the health of the public by investigating the impact of genetics on the causes and treatment of disease;
- ✓ To promote evidence-based disease prevention;
- ✓ To educate health sciences professionals and the public at large regarding hereditary and acquired genetic conditions; and to
- ✓ Appreciate the role of genetic diversity within human populations.

Research

The program offers two main areas in which students may perform research:

LABORATORY GENETICS

GENETIC DATA ANALYSIS

However, research areas are not necessarily mutually exclusive. Research experiences, including thesis research, are designed to provide “in-depth, hands-on training in the chosen area,” and students can complement their research with elective coursework, and out-of-the-classroom training and experiences.

EMERGING INDUSTRY CONCENTRATION: ENERGY SOLUTIONS

Industry Overview: Energy Solutions

Emerging Industries in the United States

National Outlook

The energy industry is rapidly growing in prominence, largely due to the continuing demand for a cleaner and more sustainable world.

Around the United States and across the globe, there has been an growing push for decreased dependence on fossil fuels and a focus on renewable energy ([Point Park University](#)). A 2019 [Deloitte](#) report notes that companies in oil and gas, chemicals, electric power and utilities, and manufacturing are all under increased pressure to build sustainable competitive advantage, and thus it has become critical to “develop and deploy a new generation of talent with skills for the 21st century.”

[PwC](#) adds that the energy industry currently faces the challenge of meeting the demands of technology-conscious consumers.

Currently, customers seek new power and utilities offerings such as new storage battery options and smartphone-based thermostat apps. The industry has not yet caught up to demand for these innovations in power sector technology.

Key Companies/Organizations in the U.S.

Major national energy solutions company headquarters are dispersed throughout the United States, including in the Midwest, South, and Northeast regions of the country:

- American Electric Power (Columbus, OH)
- Exelon (Chicago, IL)
- Dominion Energy, Inc. (Richmond, VA)
- National Grid (Waltham, MA)
- Duke Energy (Charlotte, NC)
- NextEra Energy, Inc. (Juno Beach, FL)
- Eversource Energy (Boston, MA)
- Southern Company (Atlanta, GA)

Source: [Investopedia](#), [S&P Global Platts](#)

Major Industry Sectors

There are six main sectors commonly classified under the energy solutions industry.

As shown below, each of these sectors continues to grow in today’s rapidly-transforming world.



Oil, Gas, and Chemicals

- The United States continues to consolidate its position as a leading exporter of crude oil, refined products, and natural gas. Major new capacity in base chemicals is expected to emerge in the near future.



Power and Utilities

- Electric power companies are tapping new technologies, which serve to improve operational efficiencies and prompt experiments with new business models.



Renewable Energy

- Main drivers of growth in this sector include emerging policies that support renewable growth, expanding investor interest in the sector, and advancing technologies that boost wind and solar energy’s value.



Industrial Manufacturing

- The sector continues to be strong, as manufacturers deliver solid performance results and shareholder returns.
- However, skilled talent is in short supply, and thus supply chains are straining to keep up with demand.



Engineering and Construction

- This industry plays an important role in building the future of the modern world. Main drivers of growth include increasing numbers of mega projects with advanced technologies, a focus on smart cities, and promises of a data-driven world.



Global Aerospace and Defense

- This industry is positioned for strong national (and global) growth, as passenger travel demand increases and global military expenditures continue to rise.

Source: [Deloitte](#)

Industry Overview: Energy Solutions

Emerging Industries in the United States

State Outlook

The energy solutions sector “includes technologies that provide long-term and low-impact solutions to the energy demands of residents and businesses,” and includes 22 separate industries.

Specific industries that may be beneficial to target include those that typically require at least a bachelor’s-level education for entry, such as the following:

- ✓ Architectural and Engineering Services
- ✓ Management and Technical Consulting Services
- ✓ Scientific Research and Development Services

Overall, the energy solutions sector represents 5.5 percent of total private sector employment in Missouri, with workers employed in more than 8,000 establishments. Employees in the industry earn an average annual wage that is more than \$14,000 higher than the state’s private sector average. Of note, employees in the Management and Technical Consulting Services industry can expect to earn particularly high salaries (average of \$98,014 in Missouri in 2017).

Occupations in the energy solutions industry typically require a combination of education and work experience. Top-employing occupations that require long-term training include *Civil Engineers*, *General and Operations Managers*, and *Architects*. Students who wish to pursue moderate levels of training may seek occupations such as *First-Line Supervisors*, *Architectural and Civil Drafters*, and *Bookkeeping, Accounting, and Auditing Clerks*.

Fast Facts



130,428

Number of energy solutions workers in Missouri (2017)



\$61,900

Average annual wage for energy solutions workers in Missouri (2017)

Source: [Missouri Department of Economic Development](#)

Key Companies/Organizations in Missouri

Within Missouri there are several organizations, including renewable energy companies and suppliers, that are highly involved in the challenge of meeting the state’s energy demands:



Related Higher Education Programs

NATURAL RESOURCES AND CONSERVATION

ENVIRONMENTAL STUDIES/SCIENCE

ENERGY, ENVIRONMENT, AND NATURAL RESOURCES LAW

Source: [IPEDS](#)

Exemplar Program: M.S. in Energy Management (University of Texas-Austin)

Emerging Industries in the United States

Program Overview

The University of Texas-Austin’s McCombs School of Business offers a Master of Science degree in Energy Management, which “provides a means to explore the energy future and prepare for exciting careers across the industry.”

[UT Austin](#) notes that it is committed to educating a “new, highly-trained cadre of professionals [...] to meet the energy challenges of the future.” This includes concerns related to resource depletion, environmental effects, and geopolitical relations, as well as interest in alternative energy sources and sustainability. The program can be completed in as little as 10 months, and is open to all undergraduate majors.

Curriculum Schedule

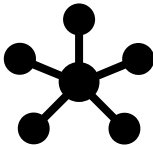
Students pursuing the M.S. in Energy Management complete a variety of core courses and electives (shown below). Students also complete a Capstone project in which they apply their skills to a realistic problem in oil and gas or electricity.

M.S. in Energy Management			
Core Courses		Elective Courses	
Required for All <ul style="list-style-type: none">AnalyticsFinancial AccountingPolicy and RegulationManagerial EconomicsCorporate FinanceStrategySeminar	Oil and Gas <ul style="list-style-type: none">Petroleum SystemsPetroleum EngineeringOil and Gas AccountingCapstone: Oil and Gas Electricity <ul style="list-style-type: none">Electricity SystemsElectrical EngineeringIntermediate AccountingCapstone: Electricity	Applicable to All <ul style="list-style-type: none">Decision AnalysisRaising CapitalEnergy Markets and Risk ManagementNegotiationsInvestmentsESG Investing	Oil and Gas <ul style="list-style-type: none">Oil and Gas LawLaw and AgreementsReal Estate LawGetting Product to MarketInternational Arbitration Electricity <ul style="list-style-type: none">Consumer BehaviorReal Estate LawElectricity Distribution Systems

Source: [University of Texas-Austin](#)

Program Components

The institution markets its M.S. in Energy Management to prospective students by highlighting several unique features and points of interest:



Interdisciplinary faculty leading small cohort classes

Capstone experience working with real-world companies on energy issues



Specialized career coaching, including career search tips, mock interviews, and industry visits

Weekly seminar with academic and industry expert presentations on cutting-edge technologies, evaluation approaches, and future trends



EMERGING INDUSTRY CONCENTRATION: HEALTH SCIENCES AND SERVICES

Industry Overview: Health Sciences and Services

Emerging Industries in the United States

National Outlook

Stakeholders across the U.S. increasingly seek innovative and cost-effective ways to deliver high-quality, patient-centered healthcare.

[Deloitte](#) describes “quality,” “outcomes,” and “value” as the three key buzzwords for healthcare in the 21st century. Its 2018 report on the global and U.S. healthcare industry outlook notes that healthcare leaders will straddle between offering value-based care and fee-for-service care, and that changing policies and processes will also play a role in the evolution of the healthcare industry.

In the coming years, it will be crucial for healthcare stakeholders to pursue cost reduction measures (e.g., alternative staffing models, shifting patients to outpatient services, reducing administrative and supply costs), while continuing to provide high-quality care for all patients. The industry should expect an increase in digital solutions, such as customer apps and patient portals, which can lead to more patient-centered relationships. Finally, cybersecurity and data risk management will continue to be a top-of-mind issue in the healthcare industry. Overall, the health sciences and services industry continues to rapidly evolve, and workers in this industry will be needed to facilitate these changes.

Key Companies/Organizations in the U.S.

Major national health science and services company headquarters are dispersed throughout the United States, including in the Midwest, Northeast, and Mid-Atlantic regions of the country:

- Abbott Laboratories (Chicago, IL)
- Aetna (Hartford, CT)
- Cardinal Health (Dublin, OH)
- Cigna (Philadelphia, PA)
- CVS Health (Woonsocket, RI)
- Express Scripts (St. Louis, MO)
- McKesson Corporation (San Francisco, CA)
- Medtronic (Minneapolis, MN)
- Stryker Corporation (Kalamazoo, MO)
- Thermo Fisher Scientific (Waltham, MA)
- UnitedHealth Group (Minnetonka, MN)

Source: [Investopedia](#), [Fortune](#)

Major Industry Sectors

The health sciences and services industry comprises four main sectors.

Together, the sectors shown below work to provide comprehensive services to meet the healthcare needs of both individuals and larger communities.



Healthcare Services and Facilities

- Includes hospitals, nursing and residential care facilities, and ambulatory healthcare services.



Medical Devices, Equipment, and Hospital Supplies Manufacturers

- Includes the latest medical technology in medical equipment, hospital supplies, products, and services, including specialist applications.



Medical Insurance, Medical Services, and Managed Care

- Includes health maintenance organizations, preferred provider organizations, healthcare consultants, medical patient financing, healthcare staff recruitment agencies, etc.



Pharmaceuticals and Related Segments

- Includes drug stores, prescription drug companies, biopharmaceutical drugs, vitamin and supplement manufacturing, health stores, etc.

Source: [TechnoFunc](#)

Industry Overview: Health Sciences and Services

Emerging Industries in the United States

State Outlook

The health sciences and services sector, which “encompasses the delivery and administration of healthcare as well as innovations that advance the efficiency of patient services,” comprises 19 separate industries ([earnmore.biz](#)).

Specific industries that may be beneficial to target include those that typically require at least a bachelor’s-level education for entry, such as the following:

- ✓ Management and Technical Consulting Services
- ✓ Computer Systems Design and Related Services
- ✓ Scientific Research and Development Services

Overall, the health sciences and services sector employs 19 percent of all private sector workers in Missouri, with workers employed across nearly 23,000 establishments ([Missouri Department of Economic Development](#)). Employees earn an average annual wage that is \$9,278 more than the state’s private sector average. Of note, employees in the Management of Companies and Enterprises, Software Publishers, and Scientific Research and Development Services industry can expect to earn particularly high salaries (close to \$100,000 in Missouri in 2017).

Occupations in the energy solutions industry typically require a combination of education and work experience. Top-employing occupations that require long-term training include *Registered Nurses*, *Software Developers*, and *Medical and Health Services Managers*. Students who wish to pursue more moderate levels of training may seek occupations such as *Nursing Assistants*, *Licensed Practical (LP) and Licensed Vocational (LV) Nurses*, and *Medical Assistants*.

Fast Facts



455,341

Number of health sciences and services workers in Missouri (2017)



\$57,088

Average annual wage for health sciences and services workers in Missouri (2017)

Source: [Missouri Department of Economic Development](#)

Key Companies/Organizations in Missouri

Missouri is home to a number of health science organizations, companies, and hospitals including:

Cerner Corporation	ClearPractice	Express Scripts
BioPharma Services Inc.	Pharma Tech Industries	Nanova Biomaterials, Inc.
Barnes-Jewish Hospital	University of Missouri Health Care	Missouri Baptist Medical Center

Related Higher Education Programs

PUBLIC HEALTH
COMMUNITY HEALTH
HEALTH SERVICES ADMINISTRATION
PHYSICAL THERAPY
DIETETICS/NUTRITION
PHARMACY
MENTAL HEALTH COUNSELING
DENTISTRY

Source: [IPEDS](#)

Exemplar Program: MPH in Community Health Promotion (University of Minnesota)

Emerging Industries in the United States

Program Overview

University of Minnesota's School of Public Health offers a Community Health Promotion MPH program that “trains students to work with populations to improve health.”

The two-year, full-time program requires a minimum of 48 credits. Part-time enrollment is an option for students balancing the program and full-time work. The goal of the program is to help students learn “how to influence policy and public opinion on health issues, develop community-based programs to prevent disease, work on issues related to a specific population, and advocate for and evaluate efforts to promote healthy behaviors.”


Curriculum Schedule

Students pursuing the degree must complete a variety of requirements related to public health, health behavior and policy, and assessment as well as an applied practice experience at a local, state, national, or international organization.

MPH in Community Health Promotion		
Public Health Core Requirements	Additional Requirements	Health Behavior and Policy Interventions Requirements
<ul style="list-style-type: none">Foundations of Public HealthBiostatistics IEnvironmental Health OR Issues in Environmental and Occupational HealthFundamentals of Epidemiology OR Epidemiologic MethodsEthics in Public Health: Professional Practice and PolicyPrinciples of Management in Health ServicesCommunity Health Theory and Practice I and II	<ul style="list-style-type: none">Applied Practice ExperienceIntegrated Learning Experience <p>Assessment Methods</p> <ul style="list-style-type: none">Evaluation OR Program Evaluation in Health and Mental Health SettingsApplied Research Methods <p>Additional Assessment Methods Courses (Choose 1)</p> <ul style="list-style-type: none">Qualitative Research MethodsBiostatistics Literacy IBiostatistics Literacy IIPractical Methods in Secondary Data Analysis	<p>Intervention Approaches (Choose 2)</p> <ul style="list-style-type: none">Designing e-Interventions for Public HealthSkills for Policy DevelopmentLegislative Advocacy Skills for Public HealthBuilding Communities, Increasing Health: Preparing for Community Health WorkMass Communication and Public HealthPublic Health Policy as a Prevention Strategy <p>Critical Issues Interventions (Choose 1)</p> <ul style="list-style-type: none">Sex, Sexuality, and Sexual HealthTopics: Urban Health and Social PolicyPublic Health Approaches to HIV/AIDSSocial Inequalities in HealthObesity and Eating Disorders


Benefits of Program

The institution highlights a number of benefits of the MPH in Community Health Promotion program, as described below.




CONNECTIONS

- Partnerships with Twin Cities communities, health departments, nonprofit organizations and policy makers provide opportunities for collaboration and real-world experience.




SUPPORTIVE ENVIRONMENT

- Students are supported through a cohort peer model, accessible faculty, and a network of more than 10,000 alumni who are dedicated to student success.



COMPREHENSIVE CURRICULUM

- Students are well-prepared with the skills needed to design, advocate for, and evaluate efforts to promote health behaviors and social conditions for populations.



PERSONALIZED PROGRAM

- Students may design their degree to suit their needs through electives that explore topics, populations, or skills-building.

Source: [University of Minnesota](#)

EMERGING INDUSTRY CONCENTRATION: INFORMATION TECHNOLOGY

Industry Overview: Information Technology

Emerging Industries in the United States

National Outlook

Information technology is one of the [fastest-growing](#) industries in the U.S.

The United States has the largest tech market in the world, representing 31 percent of the total global market in 2018 ([CompTIA](#)). In recent years, digital transformation has created significant demand for new roles across the country. In particular, hiring managers highlight the importance of skills in cybersecurity, cloud, data analytics, Internet of Things, and converged infrastructure in the coming years ([Business Insider](#)).

Paul Sallomi, [Deloitte's](#) global technology, media, and telecommunications leader, notes that “companies need to take even greater advantage of cloud platforms that make powerful artificial intelligence tools and services available to broad ranges of users.” These capabilities will help companies to transform their business models and operations.

Key Companies/Organizations in the U.S.

Many prominent information technology company headquarters are concentrated on the West Coast, in California or Washington. Others are clustered in the Northeast, in Massachusetts and Connecticut.


- Apple (Cupertino, CA)
- Amazon (Seattle, WA)
- Cisco Systems (San Jose, CA)
- Danaher (Washington, DC)
- Facebook (Menlo Park, CA)
- EMC (Hopkinton, MA)
- Google (Mountain View, CA)
- Hewlett-Packard (Palo Alto, CA)
- IBM (Armonk, NY)
- Intel (Santa Clara, CA)
- Oracle (Redwood City, CA)
- Microsoft (Redmond, WA)
- Qualcomm (San Diego, CA)
- Thermo Fisher Scientific (Waltham, MA)
- Xerox (Norwalk, CT)

Source: [Fortune](#), [Investopedia](#)


Major Industry Sectors

There are four main segments of the information technology market in the United States, as shown below.


In addition, IT workers can expect to find employment in many sectors, including: professional, scientific, and technical services; information; government; finance and insurance; manufacturing; management of companies and enterprises; wholesale trade; administrative and support services; healthcare and social assistance; and educational services.

**Telecom Services**


- Focuses on fixed voice and data, and wireless voice and data.

**IT Services**

- Focuses on planning and implementation, support services, operations management, and training.

**IT Hardware**

- Focuses on servers, personal computers, storage, smartphones, tablets, network equipment, printers, and other peripherals.

**Software**

- Focuses on applications and system infrastructure software.

Source: [GoodCall](#)

Industry Overview: Information Technology

Emerging Industries in the United States

State Outlook

The information technology sector comprises nine separate industries.

Specific industries that may be beneficial to target include those that typically require at least a bachelor’s-level education for entry, such as the following:

- ✓ Data Processing and Related Services
- ✓ Scientific Research and Development Services
- ✓ Computer Systems Design and Related Services
- ✓ Business Support Services
- ✓ Management and Technical Consulting Services

Overall, the information technology sector represents 5.1 percent of private sector employment in Missouri, with workers employed across nearly 14,000 establishments. Employees in this group have the second highest average annual wages in the state (\$73,643), second only to the finance industry. Employees in the Data Processing and Related Services industry sector can expect to earn particularly high salaries (average of \$114,046 in Missouri in 2017).

There are a variety of occupations in the information technology industry, including some that require a combination of education and high-level training: *Software Developers*, *Computer Systems Analysts*, and *Computer Programmers*. Occupations requiring more moderate levels of training include *Computer User Support Specialists*, *First-Line Supervisors*, and *Network Support Specialists*.

Fast Facts



120,716

Number of information technology workers in Missouri (2017)



\$73,643

Average annual wage for information technology workers in Missouri (2017)

Source: [Missouri Department of Economic Development](#)

Key Companies/Organizations in Missouri

There are many information technology companies that conduct significant operations in Missouri, including:

Bick Group	Cass Information Systems	Cerner Corporation	DST Systems
Emerson Electric Company	IBM	Jack Henry & Associates	MEMC Electronic Materials
Simclar Group	BIME Analytics	ECCO Select	MindMixer
Netelligent	LightEdge Solutions	Decision Insight	

Related Higher Education Programs

COMPUTER SCIENCE

INFORMATION TECHNOLOGY/INFORMATION SCIENCE

ARTIFICIAL INTELLIGENCE

Source: [IPEDS](#)

Exemplar Program: M.S. in Artificial Intelligence (Northwestern University)

Emerging Industries in the United States

Program Overview

Northwestern University offers a 15 month (five quarter) Master of Science in Artificial Intelligence through its McCormick School of Engineering.

The program website highlights recent growth in artificial intelligence technology and the increasing likelihood that “many future intelligent systems will be designed to partner with, rather than replace or even augment, human users.” To this end, there is an increasing need for individuals who can create AI systems that function effectively with human beings. In order to meet this initiative, the M.S. in Artificial Intelligence program aims to prepare graduates with high-level technical skills as well as an understanding of human environments.

The full-time program includes coursework in artificial intelligence and human cognition, independent study projects with faculty, a three-month external internship or work in a Northwestern artificial intelligence lab, and a capstone project with industry partners.

Industry Partners

The institution has several industry partners that allow students to hone skills learned in the classroom in a real-world setting. Students may pursue work with these partners for their internship experiences or capstone projects, and often are hired for full-time jobs after graduation. Current partners include:

- ✓ 84.51°
 - ✓ Amazon Web Services
 - ✓ BMO Harris
 - ✓ Briteseed
 - ✓ Civis Analytics
 - ✓ CRH Americas Materials
 - ✓ Crowe
 - ✓ Deloitte
 - ✓ Elemental Cognition
 - ✓ Ford Motor Company
 - ✓ Google
- ✓ GreenKey Technologies
 - ✓ HERE Technologies
 - ✓ IBM
 - ✓ Inference Analytics
 - ✓ KPMG
 - ✓ McKinsey & Company
 - ✓ Microsoft
 - ✓ Northwestern Medicine
 - ✓ Solstice
 - ✓ Unanimous AI

Curriculum Schedule

Students are required to take a variety of core courses which focus on introduction to artificial intelligence, machine learning, human cognition, and semantic information processing. There are a variety of options for electives, including perceptual systems, AI for game development, statistical approaches to language understanding, and robotics.

M.S. in Artificial Intelligence			
Fall Quarter (Year 1)	Spring Quarter (Year 1)	Fall Quarter (Year 2)	
<ul style="list-style-type: none">• Frameworks for AI• Introduction to AI• Machine Learning• Data Science Seminar	<ul style="list-style-type: none">• Practicum in Intelligent Systems• Computer Vision• Introduction to Robotics Lab• Agile Software Development• Conversational Interfaces• One elective course	<ul style="list-style-type: none">▪ Capstone Project (extension of independent study projects or summer work)▪ Practicum class▪ Introduction to Cognitive Modeling▪ 2 elective courses	
Winter Quarter (Year 1)	Summer Quarter (Year 1)		
<ul style="list-style-type: none">• Natural Language Processing• Knowledge Representation and Reasoning• Deep Learning Foundations from Scratch• Human Computer Interaction	No courses (completion of external internships with industry partners, or work on projects within AI labs at Northwestern)		

Source: [Northwestern University](#)

