

# Ohio

## Health Science

CAREER FIELD TECHNICAL CONTENT STANDARDS

2013

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# Foreword

The Career Field Technical Content Standards serve as the curricular framework for Ohio's career-technical education pathway programs as outlined in Ohio Administrative Code 3301-61-03 (Criteria for Secondary Workforce Development Programs).

Career Field Technical Content Standards outline the knowledge and skills needed for success in careers across multiple pathways. Validated by Ohio business and industry representatives in conjunction with Ohio educators, these standards form the basis for developing educational programming in Ohio secondary schools. The standards also serve as the framework for developing strong career pathways that connect secondary education with postsecondary education systems and the workplace.

This version of Career Field Technical Content Standards is intended to support the ongoing evolution of career technical education pathway programs. The standards tend to be somewhat broader than previous versions and are not repeated for individual pathways or occupational areas. The broader and non-duplicated statements are intended to capture the knowledge and skills that can be applied across any number of occupations in a pathway rather than focusing on the requirement of a single occupation. After all, the intent of a pathway program is to prepare a student for a range of educational and career opportunities following high school.

Pathway programs prepare students to combine broad knowledge, insight and understanding of business processes, academic attainment and workplace readiness with depth of knowledge and expertise in a technical area. Knowing that many careers will require some level of postsecondary education, the content standards also delineate the knowledge and skills necessary to seamlessly transition to postsecondary educational programs.

This document seeks to provide the basis for educational programming that will provide the employee with fundamental skill-sets that employers demand. This ensures that Ohio's workforce of tomorrow is competitive in a global environment. An environment that requires knowledge and skills can be applied in a broader context, aimed at innovation to support new products and services in an ever-changing economy.

In addition to the extensive engagement of secondary and postsecondary educators and business/industry professionals, development of these standards represents a collaborative effort of the following professional partners: the Ohio Department of Education's Office of Career-Technical Education; the Ohio Board of Regents Secondary Career-Technical Alignment Initiative; and CETE, known as the Center on Education and Training for Employment, at The Ohio State University.

Isaac Kershaw, PhD, Assistant Director  
Office of Career-Technical Education  
Ohio Department of Education

# Acknowledgements

A number of individuals contributed their time and expertise to this development. Special thanks go to all the business representatives and educators named in this document.

Further acknowledgement is due to:

- Steve Gratz, Director, Office of Career-Technical Education, Ohio Department of Education;
- Isaac Kershaw, Assistant Director, Office of Career-Technical Education, Ohio Department of Education;
- Linda O'Connor, Assistant Director, Office of Career-Technical Education, Ohio Department of Education;
- Cyndi Brill, Career-Technical Education (CTE) Academic Content Expert, Educational Consultant, Office of Career-Technical Education, Ohio Department of Education;
- Paula Compton, Associate Vice Chancellor, Articulation and Transfer, Ohio Board of Regents;
- Jamilah Jones Tucker, Director for Career-Technical Initiatives, Ohio Articulation and Transfer Network, Ohio Board of Regents;
- Robert Casto, Consultant, Ohio Board of Regents;
- Wendi Howell, Project Manager, CETE at The Ohio State University;
- Mike Wonacott, Content Development Manager, CETE at The Ohio State University; and
- Alicia Willis, Program Coordinator - Editorial Projects, CETE at The Ohio State University.

Those listed above provided vision and implementation support for the Health Science Career Field Technical Content Standards and Ohio's Health Science educational programs.

# Philosophy and Principles for Implementation

## Ohio Career Field Initiative

The overarching framework for Ohio career-technical education is outlined in the Ohio Revised Code and subsequent administrative rules, which specify career-technical programming based on 16 career fields. To view the full text of Administrative Rule 3301-61-03 (Criteria for Secondary Workforce Development Programs), go to: <http://education.ohio.gov/Topics/Career-Tech/Career-Development-OCIS/CTE-Administrative-Rules-Update>. These 16 fields provide the framework for an Ohio career field initiative that seeks to foster the educational shift necessary to respond to the needs of a rapidly changing global environment.

A career field is a “group of occupations and broad industries based on common characteristics” (see [www.careertech.org](http://www.careertech.org)). Career fields are the basis for developing both broad and specialized technical content standards that serve as a framework for curriculum, instruction, assessment and program design, addressing the needs of an entire industry and business sector. Ohio’s 16 career fields align with national efforts to broaden career-technical education, integrate career-technical with academic study and reflect the workforce needs of today and tomorrow. For today’s students to be adequately prepared for tomorrow’s workforce, they must have an education that:

- **Incorporates a broad, long-term conception of work in combination with the depth of specialization skills;**  
Employees need a comprehensive understanding beyond a single occupational area. Career-technical programming needs to be provided in a larger context, so students can generalize learning, make connections between education and work and adapt to changes in their careers. Workplace knowledge and skills are needed to prepare employees for collaborating and problem solving while contributing to the broader business process.
- **Emphasizes the acquisition of strong academic knowledge and skills; and**  
Academic skills provide the foundation for career success. The integration of academic content standards with career field technical content standards helps to contextualize learning for students, making English language arts, mathematics, social studies and science relevant to students as a means to an important end—success at work and in life.
- **Facilitates high-school-to-postsecondary transitions.**  
A lifetime of change means a lifetime of learning, including postsecondary education. Students need knowledge and skills for success in a variety of postsecondary options, including apprenticeships, industry credentialing through adult education, two- and four-year college degree programs and graduate school.

## Career Pathways

A key component of the Ohio Career Field Initiative is a career pathway, which is a coherent, articulated sequence of rigorous academic and career-technical coursework commencing in the ninth grade and leading to an associate degree, baccalaureate degree and beyond—an industry-recognized certificate and/or licensure. Pathways facilitate a seamless transition from high school to postsecondary education (including apprenticeships, adult education, two- and four-year colleges and graduate school) and from postsecondary education to the workplace. The career pathway is developed, implemented and maintained in partnership among secondary and postsecondary education, business and employers. Career pathways are available to all students, including adult learners and lead to rewarding careers.

To effectively facilitate the transition from secondary to postsecondary education and a career, high school career pathways should encompass:

1. Challenging technical coursework in a chosen career field based on career field technical content standards;
2. Rigorous academics that meet Ohio’s academic content standards and grade-level expectations;
3. Electives that relate to career objectives;
4. Instructional enhancements such as experiential and authentic learning opportunities (e.g., work-based learning, mentorships, internships) and career-technical student organization participation;
5. Opportunities (when appropriate) for program and student certification and licensure;
6. Preparation for transition to further study that includes college readiness and opportunities to earn college credit while in high school;
7. Preparation for transition to employment with advancement opportunities;
8. Performance targets that include high school academic and technical testing/exit and postsecondary entry/placement requirements;
9. Various sector(s) within an industry or encompass a function that crosses industry sectors;
10. The scope of opportunities in the related industry and available college programs;
11. Opportunities to prepare for a range of careers, including
  - a. multiple employment opportunities after high school and
  - b. opportunities for students to enter and succeed in postsecondary and continuing education programs;
12. Transferable skills required for employment in the range of occupations aligned to the pathway; and
13. Opportunities to learn skills across the pathway as well as in specialized areas.

For additional information on the Career Field Initiative, including Ohio Career Field Technical Content Standards and Career Pathways, go to <http://education.ohio.gov/Topics/Career-Tech/Career-Fields>.

# Structure and Format

The Career Field Technical Content Standards document is composed of a series of strands comprised of outcomes that each contain a set of competencies.

- A strand is a large content area under which multiple outcomes are organized, regardless of the pathway. It includes a title and a concise description with statements that capture multiple, broad areas of learner knowledge and skills expected across all outcomes in the strand. There are approximately six strands of content per career field. Strand 1, Business Operations/21<sup>st</sup> Century Skills (employability skills, leadership and communications, business ethics and law, knowledge management and information technology, global environment, business literacy, entrepreneurship/entrepreneurs, operations management, financial management, sales and marketing and principles of business economics), is the same for all career-technical education career fields.
- An outcome is an overarching statement that summarizes the knowledge and skills described in a set of individual competencies to be learned by the end of the 12<sup>th</sup> grade. There are usually 5–15 outcomes within a strand, depending on the breadth of content to be addressed.
- A competency is a specific statement of essential knowledge or skill to be learned in the pathway program. There are usually 5–12 competencies under an outcome.

Each set of outcomes and competencies is included in one or more pathways in the career field. Outcomes and competencies form the basis for developing secondary courses, programs, instruction and assessment, facilitating transition from one educational level to the next and to the workplace. This supports career readiness and long-term career success by:

- Providing the basis for effective collaboration, teamwork and communication across pathways;
- Laying the groundwork for successful transfer of knowledge and skills across pathways, thereby facilitating horizontal and vertical career success and
- Equipping students and workers with the skills needed to transition to new and emerging careers throughout a working lifetime.

All outcomes and competencies in the Career Field Technical Content Standards have been verified as essential by business and labor representatives within the pathway or pathways specified.

These essential outcomes and competencies specify industry-based knowledge or hands-on skills that CTE students need by the end of the 12<sup>th</sup> grade to be successful in their selected career pathway and on-going learning (such as college, apprenticeships and military opportunities).

# Development of Health Science Career Field Technical Content Standards

The process for the development of the Health Science Career Field Technical Content Standards began in February 2012 and culminated in June 2013. Over the course of 2012–2013, numerous business and industry representatives as well as secondary and postsecondary educators from across the state of Ohio took part in the formal development process. The following summarizes the various stages of the development process.

## Research and Development

The involvement of subject matter experts, including educators, was critical to the completion of the draft revision of the document. Development was also informed by consulting the following sources of information:

- National Association of State Directors of Career Technical Education Consortium (NASDCTEC) Common Career Technical Core (CCTC) standards and Programs of Study;
- National Healthcare Foundation Standards and Accountability Criteria (Jan, 2011);
- Nurse Aid Training and Competency Evaluation Program Standards and Guidelines (Ohio Department of Health, Revised 8/25/11);
- Ohio Board of Nursing;
- Health Care Trends 2008 (American Medical Association);
- Health Informatics curriculum (Ohio Association of Career-Technical Superintendents, Oct, 2011);
- Competency Model Clearinghouse (Allied Health – US Department of Labor);
- American Medical Technologists Laboratory Assistant (CMLA);
- Ohio Dental Assistants certification (CODA);
- Dental Assisting National Board, Inc. (CDA Exams);
- Commission on Ohio Dental Assistant certification (Revised 2011);
- Ohio State Dental Board;
- American Society for Clinical Pathology (ASCP) Board of Certification (Phlebotomy Technician);
- National Healthcareer Association (NHA) certifications;
- American College of Sports Medicine (ACSM) Certified Professional Trainer;
- National Academy of Sports Medicine (NASM);
- Joint Commission on Home Care Industry;
- Industry-based certifications/standards;
  - Certified Phlebotomist/American Society for Clinical Pathology;
  - State Tested Nurse Aide (STNA)/Ohio Department of Health;
  - License Practical Nursing (LPN)/Ohio Board of Nursing;
  - Certified Community Health Worker/Ohio Board of Nursing;
  - Certified Health Unit Coordinator/National Association of Health Unit;
  - Radiographic License/Ohio State Dental Board;
  - Certified Professional Trainer/NSCA Certification Commission;
  - Registered Medical Assistant/American Medical Technologists;
  - Certified Pharmacy Technician/Pharmacy Technician Certification Board;

- Department of Education, Office of Career-Technical Education in Oklahoma and Utah;
- SkillsUSA;
- Partnership for 21<sup>st</sup> Century Skills;
- Career-Technical Transfer Assurance Guides (CTAGs);
- University System of Ohio Academic Program Guide; and
- Ohio Industry Employment Projections Report, 2008-18.

### **Futuring Panel**

On May 1, 2012, the Health Science futuring panel brought together key business and industry representatives from across the state to advise the Ohio Department of Education on trends impacting the Health Science career field. The participants were asked to share their perceptions on changes in the workplace, employment trends, changes in technical skill requirements, needed workplace readiness skills and available industry-recognized standards and credentials. This feedback was used to develop and streamline the standards document into what is most demanded by the labor market.

### **Validation Panel**

On January 15, January 23 and February 12, 2013, a diverse group of Ohio business and industry representatives participated in panels to validate and rate the importance of the work-related competencies in the draft standards document. Drawn from various sectors and regions of the state, the panels identified what employees should know and be able to do in the four Health Science pathways. Secondary and postsecondary education representatives participated on the panels to gain an understanding of the standards development process as well as to provide their perspective to the business representatives, when needed.

### **Postsecondary Alignment**

The goal of the Secondary Career-Technical Alignment Initiative (SCTAI) was to develop new statewide Career-Technical Assurance Guides (CTAGs) for secondary career-technical institutions using the combined process of the Ohio Board of Regents' CTAG development process with the Ohio Department of Education's Career Field Technical Content Standards development process. The result of this collaboration was a tighter alignment between secondary career-technical and postsecondary content and the development of pathways that encourage college-going and increase statewide postsecondary options for career technical students. For more information on CTAGs and opportunities for statewide postsecondary articulated transfer credit, visit <https://student-transfer.ohiohighered.org>.

# Futuring Panel Contributors

May 1, 2012

## Allied Health and Nursing

**Karen Ahijevych**

Associate Dean for Academic Affairs  
The Ohio State University College of Nursing  
Columbus, OH

**Kathy Sommers**

Assistant Professor  
Mount Carmel College of Nursing  
Columbus, OH

**Beth Crow**

Human Resources  
Ohio Health – Grady Memorial Hospital  
Delaware, OH

**Rosalie Weakland**

Director of Quality Improvement  
Ohio Hospital Association  
Columbus, OH

**Amber Essman**

Assistant Professor  
Chamberlain College of Nursing  
Columbus, OH

**Jennifer Wheeler**

Practice Consultant  
Ohio Board of Nursing  
Columbus, OH

**Sandra Rains**

Chair, College of Health Sciences  
DeVry University  
Downers Grove, IL

## Exercise Science and Sports Medicine

**Lynn Darby**

Past Executive Director  
Midwest Regional Chapter of  
the American College of Sports Medicine  
Bowling Green, OH

**Tom Summanen**

Athletic Trainer Supervisor  
The Ohio State University  
Sports Medicine and Rehabilitation  
Columbus, OH

**Donny Lang**

Kettering Sports Medicine Center  
Dayton, OH

**Tammy Wadsworth**

Certified Physical Therapist  
The Ohio State University  
Sports Medicine and Rehabilitation  
Hilliard, OH

## Health Information Management

**Amy Andres**

Vice President of Data Services  
Ohio Hospital Association  
Columbus, OH

**Gina Keaton**

Consultant  
Delaware, OH

**Lauren Manson**  
Executive Director  
Ohio Health  
Information Management Association  
Worthington, OH

**Vicki Marie**  
SEARCH Program Coordinator  
Ohio Department of Health  
Columbus, OH

**Norma Morganti**  
Executive Director/Midwest Community  
College Health Information Technology  
Cuyahoga Community College  
Cleveland, OH

**Dan Paoletti**  
Chief Executive Officer (CEO)  
The Ohio Health Information Partnership  
Hilliard, OH

**John Richey**  
Director of Health Informatics Program  
The University of Findlay  
Findlay, OH

**Stacie Wolfe**  
Senior Systems Analyst/Clinical Applications  
Ohio Health  
Columbus, OH

#### Medical Bioscience

**Margaret M. van Gilse**  
Vice President of Business Development  
Bexion Pharmaceuticals  
Covington, KY

**Andrew Zupnick**  
Director of Business Development  
Novella Clinical  
Columbus, OH

**Erin Molden**  
Scientist  
Bexion Pharmaceuticals  
Covington, KY

#### Education Leaders

**Jamie Allison**  
Loveland Schools and Southwest Ohio  
Bioscience Education Consortium  
Loveland, OH

**Julie Clemens**  
Ohio Board of Regents  
Columbus, OH

**Deborah Bates**  
Dean of Allied Health  
Marion Technical College  
Marion, OH

**Martin Dzugan**  
Career/Technical Supervisor  
Pioneer Career and Technology Center  
Shelby, OH

**Cynthia Boswell**  
Instructor  
Barberton High School  
Barberton, OH

**Pamela Greenstone**  
Health Information Management Faculty  
and Consultant  
University of Cincinnati  
Cincinnati, OH

**Kim Haney**

Instructor  
Amherst Steele High School  
Amherst, OH

**Stephanie McCann**

Ohio Board of Regents  
Columbus, OH

**Mike Millward**

Exercise Science/Sports Medicine Instructor  
Pioneer Career and Technology Center  
Shelby, OH

**Kristina Nelson**

Sports and Fitness Trainer  
Miami Valley Career Technology Center  
Clayton, OH

**Nichole Oocumma**

Experiential Learning Outcomes Manager  
OhioHealth  
Columbus, OH

**Karen Rossetter**

Certified Personal Trainer/Exercise Science  
Sports Medicine/Exercise Science Instructor  
Tolles Career and Technical Center  
Plain City, OH

**Billie Sanders**

Chair/Professor of Exercise, Nutrition, and  
Sports Sciences  
Sinclair Community College  
Dayton, OH

**Bev Wolfe**

Biomedical Instructor (HOSA Coordinator)  
Miami Valley Career Technology Center  
Clayton, OH

# Development Contributors

## Allied Health and Nursing

**Peggy Adamitis**

Associate Director/Curriculum  
Butler Technology and Career Development  
Schools  
Hamilton, OH

**Tonya Barnett**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Beth Deaton**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Tina Deeter**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Rhonda Eldredge**

Instructor  
Mid-East Career and Technical Center  
Zanesville, OH

**Ellen Elliott-Bissey**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Beth Gagnon**

Instructor  
Wayne County Schools Career Center  
Smithville, OH

**Connie Grossman**

Columbus State Community College  
Columbus, OH

**Carol Healy**

Akron Public Schools  
Akron, OH

**Paul Hubaker**

The University of Toledo  
Toledo, OH

**Debbie Janis**

Good Samaritan Hospital  
Dayton, OH

**Cheryl Johnson**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Gina Keaton**

Consultant  
Delaware, OH

**Katherine Kuck**

Ohio Department of Health  
Columbus, OH

**Keri Merickel**

Wayne County Schools Career Center  
Smithville, OH

**Kimberly Moss**

Suma Health Systems  
Wooster, OH

**Melissa Myers**

Instructor  
Pioneer Career and Technology Center  
Shelby, OH

**Nichole Oocumma**

Experiential Learning Outcomes Manager  
OhioHealth  
Columbus, OH

**Karen O'Sullivan**

Instructor  
Whitmer Career and Technology Center  
Toledo, OH

**Shelly Perry**

Instructor  
Wayne County Schools Career Center  
Smithville, OH

**James Pinchak**

College of Education and Human Ecology  
The Ohio State University  
Columbus, OH

**Dawn Roberts**

Instructor  
Pioneer Career and Technology Center  
Shelby, OH

**Sheri Sauer**

Instructor  
Eastland Career Center  
Groveport, OH

**Robin Snider-Flohr**

Eastern Gateway Community College  
Steubenville, OH

**Penny Snyder**

North State Central College  
Mansfield, OH

**Jenny Spegal**

Sinclair Community College  
Dayton, OH

**Kelly Tabor**

Instructor  
Fort Hayes Career Center  
Columbus, OH

**Glenna Texler**

Instructor  
Tolles Career and Technical Center  
Plain City, OH

**Michael Vail**

Instructor  
Fort Hayes Career Center  
Columbus, OH

**Kim Ward**

Great Oaks  
Cincinnati, OH

**Rachel Whisler**

College of Dentistry  
The Ohio State University  
Columbus, OH

**Tina Wiltshire**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

**Mary Woodward**

NATCEP Coordinator  
Ohio Department of Health  
Columbus, OH

**Exercise Science and Sports Medicine****Don Laubenthal**

Columbus State Community College  
Columbus, OH

**Matt Money**

Instructor  
Miami Valley Career Technology Center  
Clayton, OH

## Health Information Management

### **Kenneth Hall**

State Farm® Insurance  
Toledo, OH

### **Pam Snider**

Instructor  
Tolles Career and Technical Center  
Plain City, OH

## Medical Bioscience

### **Gerald Collins**

Instructor  
Fort Hayes Career Center  
Columbus, OH

### **Kerri Matheny**

Great Oaks  
Cincinnati, OH

### **Karen DiMauro**

Instructor  
Trumbull County Career and Technical  
Center  
Champion Heights, OH

### **Adam Miller**

Lorain County Community College  
Elyria, OH

### **Lorie Haskell**

Instructor  
Tolles Career and Technical Center  
Plain City, OH

### **Rachel Sanders**

Springfield Clark Career Technology Center  
Springfield, OH

### **Tracy Greeley Howard**

Woodward Career Technical High School  
Cincinnati, OH

### **Brad Tolly**

Whitmer Career and Technology Center  
Toledo, OH

### **Mandy VanDyke**

Kettering Schools  
Kettering, OH

# Validation Panel Contributors

January 15, January 23 and February 12, 2013

## Allied Health and Nursing

### **Katie Blair**

Emergency Room Nurse  
Promedia Health Systems  
Toledo, OH

### **Matt Seeley**

Health Science Executive Editor  
DELMAR Cengage Learning  
Clifton Park, NY

### **Chris Gase**

Marion Technical College  
Marion, OH

### **Luann Toth**

Registered Nurse  
OhioHealth  
Columbus, OH

### **Roslyn Ginter**

Licensed School Nurse  
Butler Technology and Career Development  
Schools  
Hamilton, OH

### **Kathy Sommers**

Assistant Professor  
Mount Carmel College of Nursing  
Columbus, OH

### **Tammy Ricketson**

Account Manager  
DELMAR Cengage Learning  
Clifton Park, NY

### **Jennifer Wheeler**

Practice Consultant  
Ohio Board of Nursing  
Columbus, OH

## Exercise Science and Sports Medicine

### **David Albo**

Director  
National Academy of Sports Medicine  
Chandler, AZ

### **Jennifer Mathias**

Clinical Team Leader  
OhioHealth - Dublin Methodist Hospital  
Dublin, OH

### **Christopher Basinger**

Personal Trainer  
Gahanna YMCA  
Gahanna, OH

### **Allen Russell**

Director of Academic Affairs  
National Academy of Sports Medicine  
Chandler, AZ

## Health Information Management

### **Lauren Manson**

Executive Director  
Ohio Health Information Management  
Association  
Worthington, OH

### **Vicki Marie**

SEARCH Program Coordinator  
Ohio Department of Health  
Columbus, OH

**Krystal Phillips**

Medical Records Coding  
The Ohio State University Veterinary Medical Center  
Columbus, OH

**Medical Bioscience**

**Ed Firgau**

Supervisor/Quality Assurance  
Laboratory Medicine  
Nationwide Children's Hospital  
Columbus, OH

**Phil Monroe**

Program Manager, Safety Pharmacology  
and Commercial Technology  
Battelle Memorial Institute  
Columbus, OH

**Linda Huffman**

Supervisor, Blood Bank and  
Molecular Testing  
LabCorp  
Dublin, OH

**Michele R. Capell**

Laboratory  
Boehringer Ingelheim Roxane, Inc.  
Columbus, OH

**Abdul Isu**

Lab Supervisor  
Abbott Labs  
Columbus, OH

**MaryEllen Tancred**

Program Director, MLT Program  
Columbus State Community College  
Columbus, OH

**Jessica Mantini**

Medical Laboratory Science Program  
The Ohio State University  
Columbus, OH

**Education Leaders**

**Jamie Allison**

Loveland Schools and Southwest Ohio  
Bioscience Education Consortium  
Loveland, OH

**Robery Bundy**

Instructor  
Clay High School  
Oregon, OH

**Deborah Bates**

Dean of Allied Health  
Marion Technical College  
Marion, OH

**Gayle Cronin**

Medical Office Admin. Instructor  
C-Tech Licking County  
Newark, OH

**Pam Bell**

Pioneer Career and Technology Center  
Shelby, OH

**Teresa Crozier**

Medical Academy Instructor  
Whitmer Career and Technology Center  
Toledo, OH

**Sheryl Diglia**  
Apollo Career Center  
Lima, OH

**Laura Eby**  
Butler Technology and Career Development  
Schools  
Hamilton, OH

**Josephine Foster**  
Instructor  
Mahoning County Career and Technical  
Center  
Canfield, OH

**Pamela Greenstone**  
Health Information Management Faculty  
and Consultant  
University of Cincinnati  
Cincinnati, OH

**Diane Holzer**  
Instructor  
Mahoning County Career and Technical  
Center  
Canfield, OH

**Kelly Lewis**  
Instructor, Bioscience Technologies  
Eastland-Fairfield Career and Technical  
Schools  
Groveport, OH

**Stephanie McNight**  
Instructor and Certified Athletic Trainer  
Alliance City Schools  
Alliance, OH

**Wanda Miller**  
Instructor  
Lima City Schools  
Lima, OH

**Mike Millward**  
Exercise Science/Sports Medicine Instructor  
Pioneer Career and Technology Center  
Shelby, OH

**Mitsu Narui**  
Ohio Board of Regents  
Columbus, OH

**Debbie Purcell**  
Ohio High Point Career Center  
Bellefontaine, OH

**Jamie Roberts**  
Pioneer Career and Technology Center  
Shelby, OH

**Gail Sleighter**  
Buckeye Career Center  
New Philadelphia, OH

**Pam Vorkapich**  
Practical Nursing Instructor  
Wayne County Schools Career Center  
Smithville, OH

**Jan Walmire**  
Pioneer Career and Technology Center  
Shelby, OH

**Stacey Wampler**  
Instructor  
Madison Local Schools  
Mansfield, OH

# Career Pathways Definitions

The Health Science Career Field prepares students for careers in Allied Health and Nursing, Exercise Science and Sports Medicine, Health Information Management and Medical Bioscience.

## Allied Health and Nursing

Allied Health and Nursing program areas will prepare students with the mathematics, science and technical skills to provide clinical assistance in patient care, emergency interventions (CPR, first-aid, AED), nutrition, dentistry and surgery.

### Careers for which this pathway prepares students include:

|                                |                          |
|--------------------------------|--------------------------|
| Dental Assistant               | Patient Care Assistant   |
| Licensed Practical Nurse (LPN) | Pharmacy Aide/Technician |
| Medical Assistant              | Surgical Technician      |
| Nurse Aide (including STNA)    | Respiratory Technician   |
| Phlebotomist                   | Optometry                |

### Postsecondary majors for which this pathway prepares students include:

Clinical Nutrition  
Community Health and Preventative Medicine  
Occupational Health and Industrial Hygiene  
Dental Laboratory Technology  
Optics/Optical Sciences  
Health Care Administration  
Gerontology  
Licensed Practical Nurse Training  
Register Nursing  
Surgical Technology

## Exercise Science and Sports Medicine

Exercise Science and Sports Medicine program areas will prepare students with the mathematics, science and technical skills to assist with exercise and rehabilitative procedures for the human body.

### Careers for which this pathway prepares students include:

|                                  |                                  |
|----------------------------------|----------------------------------|
| Athletic Trainer                 | Physical Therapist Assistant     |
| Personal Trainer                 | Occupational Therapist Assistant |
| Kinesiology and Exercise Science | Medical Massage Therapist        |

### Postsecondary majors for which this pathway prepares students include:

|                                       |                                  |
|---------------------------------------|----------------------------------|
| Athletic Training                     | Kinesiology and Exercise Science |
| Foods, Nutrition and Wellness Studies |                                  |



# Strand/Outcome Pathway Chart

An "X" indicates that the pathway applies to the outcome.

| Strand/Outcome  | Pathway                   |                                      |                               |                    |
|---|---------------------------|--------------------------------------|-------------------------------|--------------------|
|   | Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
| <b>Strand 1: Business Operations/21st Century Skills</b> page 2 |                           |                                      |                               |                    |
| Outcome 1.1: Employability Skills                               | X                         | X                                    | X                             | X                  |
| Outcome 1.2: Leadership and Communications                      | X                         | X                                    | X                             | X                  |
| Outcome 1.3: Business Ethics and Law                            | X                         | X                                    | X                             | X                  |
| Outcome 1.4: Knowledge Management and Information Technology    | X                         | X                                    | X                             | X                  |
| Outcome 1.5: Global Environment                                 | X                         | X                                    | X                             | X                  |
| Outcome 1.6: Business Literacy                                  | X                         | X                                    | X                             | X                  |
| Outcome 1.7: Entrepreneurship/Entrepreneurs                     | X                         | X                                    | X                             | X                  |
| Outcome 1.8: Operations Management                              | X                         | X                                    | X                             | X                  |
| Outcome 1.9: Financial Management                               | X                         | X                                    | X                             | X                  |
| Outcome 1.10: Sales and Marketing                               | X                         | X                                    | X                             | X                  |
| Outcome 1.11: Principles of Business Economics                  | X                         | X                                    | X                             | X                  |
| <b>Strand 2: Human Body System</b> page 12                      |                           |                                      |                               |                    |
| Outcome 2.1: Human Body Form, Function and Pathophysiology      | X                         | X                                    | X                             | X                  |
| Outcome 2.2: Evaluate Body Systems                              | X                         | X                                    |                               |                    |
| Outcome 2.3: Medical Terminology                                | X                         | X                                    | X                             | X                  |
| <b>Strand 3: Therapeutic Interventions</b> page 15              |                           |                                      |                               |                    |
| Outcome 3.1: Environmental Interventions                        | X                         | X                                    |                               | X                  |
| Outcome 3.2: Health Promotion Interventions                     | X                         | X                                    |                               |                    |
| Outcome 3.3: Pharmaceutical Interventions                       | X                         | X                                    |                               | X                  |
| Outcome 3.4: Emergency Interventions                            | X                         | X                                    |                               | X                  |
| Outcome 3.5: Nutritional Interventions                          | X                         | X                                    |                               |                    |
| Outcome 3.6: Exercise and Rehabilitative Intervention           | X                         | X                                    |                               |                    |
| Outcome 3.7: Dental Interventions                               | X                         | X                                    |                               |                    |
| Outcome 3.8: Surgical Interventions                             | X                         |                                      |                               |                    |
| <b>Strand 4: Assistive Care</b> page 22                         |                           |                                      |                               |                    |
| Outcome 4.1: Scope of Practice                                  | X                         | X                                    |                               |                    |

| Strand/Outcome   | Pathway                   |                                      |                               |                    |
|--|---------------------------|--------------------------------------|-------------------------------|--------------------|
|  | Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
| Outcome 4.2: Therapeutic Communication and Interpersonal Skills  | X                         | X                                    |                               |                    |
| Outcome 4.3: Pathogenic Microorganisms, Infection Control and Infection                                | X                         | X                                    |                               | X                  |
| Outcome 4.4: Hygiene   | X                         |                                      |                               |                    |
| Outcome 4.5: Ambulation and Mobility   | X                         | X                                    |                               |                    |
| Outcome 4.6: Elimination   | X                         |                                      |                               |                    |
| Outcome 4.7: Psycho-social, Behavioral and Emotional   | X                         | X                                    |                               |                    |
| Outcome 4.8: End-of-Life Care  | X                         | X                                    |                               |                    |
| <b>Strand 5: Bioscience Research and Development</b> <span style="float: right;"><b>page 27</b></span> |                           |                                      |                               |                    |
| Outcome 5.1: Handling, Preparation, Storage and Disposal   | X                         |                                      |                               | X                  |
| Outcome 5.2: Foundations of Chemistry  | X                         |                                      |                               | X                  |
| Outcome 5.3: Microbiology Testing and Technology   | X                         |                                      |                               | X                  |
| Outcome 5.4: Bio-Molecular Technology  | X                         |                                      |                               | X                  |
| Outcome 5.5: Laboratory Standard Operational Procedures  | X                         |                                      |                               | X                  |
| Outcome 5.6: Culturing   | X                         |                                      |                               | X                  |
| Outcome 5.7: Bioreactor Technologies   | X                         |                                      |                               | X                  |
| Outcome 5.8: Biotechnology Research and Experiments  |                           |                                      |                               | X                  |
| Outcome 5.9: Clinical Laboratory Techniques and Procedures   | X                         |                                      |                               | X                  |
| <b>Strand 6: Health Information Management</b> <span style="float: right;"><b>page 36</b></span>       |                           |                                      |                               |                    |
| Outcome 6.1: Health Information Literacy   | X                         | X                                    | X                             |                    |
| Outcome 6.2: Confidentiality, Privacy and Security   | X                         | X                                    | X                             |                    |
| Outcome 6.3: Electronic Health Records and Coding  | X                         | X                                    | X                             |                    |
| <b>Total Outcomes by Pathway:</b>  | 41                        | 30                                   | 16                            | 26                 |
| <b>Total Outcomes:</b>   | 42                        |                                      |                               |                    |

# **HEALTH SCIENCE**

## **CAREER FIELD TECHNICAL CONTENT STANDARDS**

### **STRANDS 1-6**

## Strand 1. Business Operations/21st Century Skills

Learners apply principles of economics, business management, marketing and employability in an entrepreneur, manager and employee role to the leadership, planning, developing and analyzing of business enterprises related to the career field.

### Outcome 1.1. Employability Skills

Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

### Competencies

- 1.1.1. Identify the knowledge, skills and abilities necessary to succeed in careers.
- 1.1.2. Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience.
- 1.1.3. Develop a career plan that reflects career interests, pathways and secondary and postsecondary options.
- 1.1.4. Describe the role and function of professional organizations, industry associations and organized labor and use networking techniques to develop and maintain professional relationships.
- 1.1.5. Develop strategies for self-promotion in the hiring process (e.g., filling out job applications, resumé writing, interviewing skills, portfolio development).
- 1.1.6. Explain the importance of work ethic, accountability and responsibility and demonstrate associated behaviors in fulfilling personal, community and workplace roles.
- 1.1.7. Apply problem-solving and critical-thinking skills to work-related issues when making decisions and formulating solutions.
- 1.1.8. Identify the correlation between emotions, behavior and appearance and manage those to establish and maintain professionalism.
- 1.1.9. Give and receive constructive feedback to improve work habits.
- 1.1.10. Adapt personal coping skills to adjust to taxing workplace demands.
- 1.1.11. Recognize different cultural beliefs and practices in the workplace and demonstrate respect for them.
- 1.1.12. Identify healthy lifestyles that reduce the risk of chronic disease, unsafe habits and abusive behavior.

**Outcome 1.2. Leadership and Communications**

Process, maintain, evaluate and disseminate information in a business. Develop leadership and team building to promote collaboration.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.2.1. Extract relevant, valid information from materials and cite sources of information (e.g., medical reports, fitness assessment, medical test results).
- 1.2.2. Deliver formal and informal presentations.
- 1.2.3. Identify and use verbal, nonverbal and active listening skills to communicate effectively.
- 1.2.4. Use negotiation and conflict-resolution skills to reach solutions.
- 1.2.5. Communicate information for an intended audience and purpose.
- 1.2.6. Use proper grammar and expression in all aspects of communication.
- 1.2.7. Use problem-solving and consensus-building techniques to draw conclusions and determine next steps.
- 1.2.8. Identify the strengths, weaknesses and characteristics of leadership styles that influence internal and external workplace relationships.
- 1.2.9. Identify advantages and disadvantages involving digital and/or electronic communications.
- 1.2.10. Use interpersonal skills to provide group leadership, promote collaboration and work in a team.
- 1.2.11. Write professional correspondence, documents, job applications and resumés.
- 1.2.12. Use technical writing skills to complete forms and create reports.
- 1.2.13. Identify stakeholders and solicit their opinions.
- 1.2.14. Use motivational strategies to accomplish goals.

**Outcome 1.3. Business Ethics and Law**

Analyze how professional, ethical and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.3.1. Analyze how regulatory compliance affects business operations and organizational performance.
- 1.3.2. Follow protocols and practices necessary to maintain a clean, safe and healthy work environment.
- 1.3.3. Use ethical character traits consistent with workplace standards (e.g., honesty, personal integrity, compassion, justice).
- 1.3.4. Identify how federal and state consumer protection laws affect products and services.
- 1.3.5. Access and implement safety compliance measures (e.g., quality assurance information, safety data sheets [SDSs], product safety data sheets [PSDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA]) that contribute to the continuous improvement of the organization.
- 1.3.6. Identify deceptive practices (e.g., bait and switch, identity theft, unlawful door-to-door sales, deceptive service estimates, fraudulent misrepresentations) and their overall impact on organizational performance.
- 1.3.7. Identify the labor and practice laws that affect employment and the consequences of noncompliance for both employee and employer (e.g., harassment, labor, employment, employment interview, testing, minor labor laws, Americans with Disabilities Act, Fair Labor Standards Acts, Equal Employment Opportunity Commission [EEOC], human trafficking) and interpret personal safety rights according to the employee Right-to-Know Plan.
- 1.3.8. Verify compliance with computer and intellectual property laws and regulations.
- 1.3.9. Identify potential conflicts of interest (e.g., personal gain, project bidding) between personal, organizational and professional ethical standards.

#### **Outcome 1.4. Knowledge Management and Information Technology**

Demonstrate current and emerging strategies and technologies used to collect, analyze, record and share information in business operations.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
|----------------------------------|---|--------------------------------------|---------------------------|
| X                                | X   | X                                    | X                         |

#### **Competencies**

- 1.4.1. Use office equipment to communicate (e.g., phone, radio equipment, fax machine, scanner, public address systems).
- 1.4.2. Select and use software applications to locate, record, analyze and present information (e.g., word processing, e-mail, spreadsheet, databases, presentation, Internet search engines).
- 1.4.3. Verify compliance with security rules, regulations and codes (e.g., property, privacy, access, accuracy issues, client and patient record confidentiality) pertaining to technology specific to the industry pathway.
- 1.4.4. Use system hardware to support software applications.
- 1.4.5. Use information technology tools to maintain, secure and monitor business records.
- 1.4.6. Use an electronic database to access and create business and technical information.
- 1.4.7. Use personal information management and productivity applications to optimize assigned tasks (e.g., lists, calendars, address books).
- 1.4.8. Use electronic media to communicate and follow network etiquette guidelines.

#### **Outcome 1.5. Global Environment**

Evaluate how beliefs, values, attitudes and behaviors influence organizational strategies and goals.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
|----------------------------------|---|--------------------------------------|---------------------------|
| X                                | X   | X                                    | X                         |

#### **Competencies**

- 1.5.1. Describe how cultural understanding, cultural intelligence skills and continual awareness are interdependent.
- 1.5.2. Describe how cultural intelligence skills influence the overall success and survival of an organization.
- 1.5.3. Use cultural intelligence to interact with individuals from diverse cultural settings.
- 1.5.4. Recognize barriers in cross-cultural relationships and implement behavioral adjustments.
- 1.5.5. Recognize the ways in which bias and discrimination may influence productivity and profitability.
- 1.5.6. Analyze work tasks for understanding and interpretation from a different cultural perspective.
- 1.5.7. Use intercultural communication skills to exchange ideas and create meaning.
- 1.5.8. Identify how multicultural teaming and globalization can foster development of new and improved products and services and recognition of new opportunities.

**Outcome 1.6. Business Literacy**

Develop foundational skills and knowledge in entrepreneurship, financial literacy and business operations.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.6.1. Identify business opportunities.
- 1.6.2. Assess the reality of becoming an entrepreneur, including advantages and disadvantages (e.g., risk versus reward, reasons for success and failure).
- 1.6.3. Explain the importance of planning your business.
- 1.6.4. Identify types of businesses, ownership and entities (i.e., individual proprietorships, partnerships, corporations, cooperatives, public, private, profit, not-for-profit).
- 1.6.5. Describe organizational structure, chain of command, the roles and responsibilities of the organizational departments and interdepartmental interactions (e.g., following physician’s orders).
- 1.6.6. Identify the target market served by the organization, the niche that the organization fills and an outlook of the industry.
- 1.6.7. Identify the effect of supply and demand on products and services.
- 1.6.8. Identify the features and benefits that make an organization’s product or service competitive.
- 1.6.9. Explain how the performance of an employee, a department and an organization is assessed.
- 1.6.10. Describe the impact of globalization on an enterprise or organization.
- 1.6.11. Describe how all business activities of an organization work within the parameters of a budget.
- 1.6.12. Describe classifications of employee benefits, rights, deductions and compensations.

**Outcome 1.7. Entrepreneurship/Entrepreneurs**

Analyze the environment in which a business operates and the economic factors and opportunities associated with self-employment.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.7.1. Compare and contrast the four types of business ownership (i.e., individual proprietorships, partnerships, corporations, cooperatives).
- 1.7.2. Explain the role of profit as the incentive to entrepreneurs in a market economy.
- 1.7.3. Identify the factors that contribute to the success and failure of entrepreneurial ventures.
- 1.7.4. Assess the roles of nonprofit and for-profit businesses.
- 1.7.5. Develop a business plan.
- 1.7.6. Describe life cycles of an entrepreneurial business and an entrepreneur.
- 1.7.7. Create a list of personal strengths, weaknesses, skills and abilities needed to be successful as an entrepreneur.
- 1.7.8. Explain pathways used to become an entrepreneur.
- 1.7.9. Conduct a self-assessment to determine entrepreneurial potential.
- 1.7.10. Describe techniques for obtaining experience (e.g., apprenticeship, co-operative [co-op] education, work placement, internship, job shadowing) related to an entrepreneurial objective.
- 1.7.11. Identify initial steps in establishing a business (e.g., limited liability company [LLC], tax ID, permits, insurance, licensing).
- 1.7.12. Identify resources available to entrepreneurs (e.g., Small Business Administration, mentors, information resources, educational opportunities).
- 1.7.13. Protect intellectual property and knowledge (e.g., copyright, patent, trademark, trade secrets, processes).

### **Outcome 1.8. Operations Management**

Plan, organize and monitor an organization or department to maximize contribution to organizational goals and objectives.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
|----------------------------------|---|--------------------------------------|---------------------------|
| X                                | X   | X                                    | X                         |

#### **Competencies**

- 1.8.1. Forecast future resources and budgetary needs using financial documents (e.g., balance sheet, demand forecasting, financial ratios).
- 1.8.2. Select and organize resources to develop a product or a service.
- 1.8.3. Analyze the performance of organizational activities and reallocate resources to achieve established goals.
- 1.8.4. Identify alternative actions to take when goals are not met (e.g., changing goals, changing strategies, efficiencies).
- 1.8.5. Use inventory and control systems to purchase materials, supplies and equipment (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just in Time [JIT]; LEAN).
- 1.8.6. Identify the advantages and disadvantages of carrying cost and Just-in-Time (JIT) production systems and the effects of maintaining inventory (e.g., perishable, shrinkage, insurance) on profitability.
- 1.8.7. Collect information and feedback to help assess the organization’s strategic planning and policymaking processes.
- 1.8.8. Identify routine activities for maintaining business facilities and equipment.
- 1.8.9. Develop a budget that reflects the strategies and goals of the organization.
- 1.8.10. Analyze how business management and environmental management systems (e.g., health, safety) contribute to continuous improvement and sustainability.

**Outcome 1.9. Financial Management**

Use financial tools, strategies and systems to develop, monitor and control the use of financial resources to ensure personal and business financial well-being.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.9.1. Create, analyze and interpret financial documents (e.g., budgets, income statements).
- 1.9.2. Identify tax obligations.
- 1.9.3. Review and summarize savings, investment strategies and purchasing options (e.g., cash, lease, finance, stocks, bonds).
- 1.9.4. Identify credit types and their uses in order to establish credit.
- 1.9.5. Identify ways to avoid or correct debt problems (e.g., collection agency payments and post-collection agency payments).
- 1.9.6. Explain how credit ratings and the criteria lenders use to evaluate repayment capacity affect access to loans.
- 1.9.7. Review and summarize categories (types) of insurance and identify how insurances can reduce financial risk.
- 1.9.8. Identify income sources and expenditures.
- 1.9.9. Compare and contrast different banking services available through financial institutions.
- 1.9.10. Identify the role of depreciation in tax planning and liability.

**Outcome 1.10. Sales and Marketing**

Manage pricing, place, promotion, packaging, positioning and public relations to improve quality customer service.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.10.1. Identify how the roles of sales, advertising and public relations contribute to a company’s brand.
- 1.10.2. Determine the customer’s/client’s needs and identify solutions and potential community resources.
- 1.10.3. Communicate features, benefits and warranties of a product or service to the customer/client.
- 1.10.4. Identify the company policies and procedures for initiating product and service improvements.
- 1.10.5. Monitor customer/client expectations and determine product/service satisfaction by using measurement tools.
- 1.10.6. Discuss the importance of correct pricing to support a product’s or service’s positioning in the marketing mix.
- 1.10.7. Describe the importance and diversity of distribution channels (i.e., direct, indirect) to sell a product.
- 1.10.8. Use promotional techniques to maximize sales revenues (e.g., advertising, sales promotions, publicity, public relations).
- 1.10.9. Describe how product mix (e.g., product line, product items) maximizes sales revenues, market, share and profit margin.
- 1.10.10. Demonstrate sales techniques.

**Outcome 1.11. Principles of Business Economics**

Examine and employ economic principles, concepts and policies to accomplish organizational goals and objectives.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 1.11.1. Identify the economic principles that guide geographic location of an industry's facilities (e.g., relative scarcity, price, quantity of products and services).
- 1.11.2. Identify the difference between monetary and nonmonetary incentives and explain how changes in incentives cause changes in behavior.
- 1.11.3. Use economic indicators to identify economic trends and conditions (e.g., inflation, interest rate fluctuations, unemployment rates).
- 1.11.4. Determine how the quality, quantity and pricing of goods and services are affected by domestic and international competition in a market economy.
- 1.11.5. Analyze factors that affect currency and exchange rates.
- 1.11.6. Explain how financial markets and government policies influence interest rates (credit ratings/debt ceiling), trade deficits and unemployment.
- 1.11.7. Describe how economic performance and culture are interdependent.
- 1.11.8. Identify the relationships between economy, society and environment that lead to sustainability.
- 1.11.9. Describe how laws and regulations influence domestic and international trade.

## Strand 2. Human Body System

Learners will discuss the various forms, functions and pathophysiology associated with body systems and alterations related to the normal aging process, obtain a health history, perform an evaluation of body systems and document using medical terminology.

### Outcome 2.1. Human Body Form, Function and Pathophysiology

Discuss the various human body systems, alterations related to the normal aging process and possible dysfunctions.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

### Competencies

- 2.1.1. Describe the physical characteristics, components and function of blood (e.g., ABO, Rh, blood cells, precursors and respiratory).
- 2.1.2. Describe the cardiovascular system and trace the path of blood and factors affecting blood flow.
- 2.1.3. Describe how blood pressure is controlled and factors influencing changes in blood pressure.
- 2.1.4. Describe the function and components of the respiratory system and pulmonary ventilation and factors influencing respiratory rates.
- 2.1.5. Describe nerve tissue and the nervous system, including regions of the brain and their function, the spinal nerves, signal transmission at synapses and the sympathetic and parasympathetic system.
- 2.1.6. Describe the musculoskeletal system, including skeletal, cardiac and smooth muscle, various bone structures and the role of bone marrow and joints and injuries.
- 2.1.7. Describe the gastrointestinal system, including structures of chewing, swallowing, digestion and elimination and the role of accessory organs including the liver, pancreas and gallbladder.
- 2.1.8. Describe the urinary system structures and principles of glomerular filtration, electrolyte exchanges and their role in the production of red blood cells and the control of blood pressure.
- 2.1.9. Describe the immune system and the lymphatic system's role in immunity.
- 2.1.10. Describe the sensory system, related structures and functions.
- 2.1.11. Describe the endocrine system, its structures and the role of hormones.
- 2.1.12. Differentiate between the male and female reproductive system, structures and function.
- 2.1.13. Describe the integumentary system, related structures and functions.
- 2.1.14. Describe the difference between pathology and physiology and the conditions typically observed during a disease state.
- 2.1.15. Explain the pathophysiology changes associated with or resulting from disease or injury.

## **Outcome 2.2. Evaluate Body Systems**

Use interviewing techniques, observation, auscultation, palpation and percussion to perform a systematic head-to-toe evaluation of the body systems and document using medical terminology.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
|----------------------------------|---|--------------------------------------|---------------------------|
| X                                | X   |                                      |                           |

### **Competencies**

- 2.2.1. Provide privacy and demonstrate cultural sensitivity.
- 2.2.2. Contact interpretive services for non-English speaking and English as a Second Language (ESL) individuals.
- 2.2.3. Use age-appropriate language to systematically review disease processes related to each body system (e.g., vaccinations, allergies, reactions, history of abuse, history of suicidal ideation, alcohol use, risk behaviors, stressors, sleep patterns, nutritional patterns, occupation, living conditions, current medications, over-the-counter medications, herbals).
- 2.2.4. Perform vital signs.
- 2.2.5. Determine level of consciousness and cognition.
- 2.2.6. Determine pupil reactivity and accommodation.
- 2.2.7. Determine site, onset, type, quality and level of pain.
- 2.2.8. Determine what decreases and increases the pain experience.
- 2.2.9. Auscultate lungs for abnormal breath sounds.
- 2.2.10. Perform pulmonary function testing (e.g., vital capacity, tidal volumes, total lung capacity).
- 2.2.11. Auscultate bowel sounds and palpate abdomen for distention and tautness.
- 2.2.12. Determine joint mobility and muscle strength (e.g., range-of-motion).
- 2.2.13. Identify open wounds, skin abrasions, decubitus and rashes.
- 2.2.14. Observe for excessive body fluid loss (i.e., blood loss, diarrhea, vomiting, profuse diaphoresis).
- 2.2.15. Identify symptoms of substance abuse.
- 2.2.16. Identify patterns of behavior to determine risk to self and others.

**Outcome 2.3. Medical Terminology**

Decipher medical terms through word origin and structure with an emphasis on derivation, meaning, pronunciation and spelling.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             | X                  |

**Competencies**

- 2.3.1. Build and decipher medical term meanings by identifying and using word elements (e.g., word roots, prefixes, suffixes, combining forms).
- 2.3.2. Apply the rules used to build singular and plural forms of medical terminology derived from the Greek and Latin language.
- 2.3.3. Use diagnostic, symptomatic and procedural terms to read and interpret various medical reports.
- 2.3.4. Use the appropriate abbreviations and symbols to identify anatomical, physiological and pathological classifications and the associated medical specialties and procedures.
- 2.3.5. Use proper spelling and pronunciation of medical terms when communicating medical instructions and preparing medical documentations.

### Strand 3. Therapeutic Interventions

Learners will administer or assist with environmental, health promotion, pharmacological, emergency, nutritional, exercise and rehabilitative and dental and surgical interventions and/or procedures to improve the individuals' outcome and quality of life across the life span within their scope of practice, evaluate outcomes and ensure individual's rights.

#### Outcome 3.1. Environmental Interventions

Create and maintain a safe, sterile, efficient, age-appropriate care environment.

An "X" indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               | X                  |

#### Competencies

- 3.1.1. Use standard precaution guidelines, recommended by the Centers for Disease Control and Prevention, for reducing the risk of transmission of blood-borne and other pathogens.
- 3.1.2. Maintain patients' rights, respect individual's choices and obtain informed consent.
- 3.1.3. Describe confidentiality guidelines in the Health Insurance Portability and Accountability Act (HIPAA).
- 3.1.4. Decrease the risk of injury and elopement to the individual or others (e.g., by using restraints, alarms, bedrails, hi-low beds, padding, non-slip footwear and hand rails).
- 3.1.5. Identify and respond to emergency call lights and alarms.
- 3.1.6. Identify and remove environmental and electrical hazards to decrease the risk of falls, injury, or ingestion of dangerous materials (e.g., clutter, equipment, throw rugs, spills, plants, hazardous chemicals).
- 3.1.7. Demonstrate chemical and electrical safety and their application to the work environment.
- 3.1.8. Determine the risk of burns resulting from equipment, liquids, chemicals and fire.
- 3.1.9. Describe and follow the precautions used in oxygen therapy and pressurized gases.
- 3.1.10. Clean, store, or dispose of supplies, specimens and laboratory glassware following protocol and standard precautions.
- 3.1.11. Determine risk of bleeding and implement precautions.
- 3.1.12. Implement disaster preparedness response to fire, tornado, emergency evacuation, hazardous material spill, infant/child abduction, bomb threat, violent person, active shooter, missing adult and loss of power.
- 3.1.13. Identify risk factors of exposure to hazardous materials (i.e., chemical, radiologic, microbial) and provide safety precautions.
- 3.1.14. Apply principles of asepsis and sterile techniques and determine recommended use of germicides (e.g., sterilant, disinfectant, antiseptic).
- 3.1.15. Follow Standard Operational Protocols (SOP's) for exposure and disposal of tissue cultures, contaminated materials, body fluids and radioisotopes and place sharps in biohazard containers.
- 3.1.16. Use proper body mechanics to perform therapeutic interventions.
- 3.1.17. Identify electrical, thermal and drowning risks in aquatic environments.
- 3.1.18. Account for all instruments, supplies and equipment.
- 3.1.19. Control the level of distractions and noise.
- 3.1.20. Perform the safe operation, packing and cleaning of equipment.

**Outcome 3.2. Health Promotion Interventions**

Identify and communicate health promotion and wellness to individuals, families and communities.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

**Competencies**

- 3.2.1. Describe the national and state health agenda for wellness.
- 3.2.2. Identify body composition, neuromuscular flexibility, agility, balance, coordination and proprioception.
- 3.2.3. Measure and document an individual’s cardiorespiratory fitness, muscular strength, endurance and power.
- 3.2.4. Identify the needs of the individual, family and community related to physical, biological, technological, spiritual, religious, social and behavioral concepts.
- 3.2.5. Share information to promote, maintain and restore.
- 3.2.6. Communicate the importance of age-appropriate healthy eating, exercise and preventative medicine.
- 3.2.7. Communicate the medical benefits and risks associated with immunizations across the life span.
- 3.2.8. Identify the components of wellness and communicate the relationship between physical fitness, physical performance, injury prevention and nutritional intake.

### Outcome 3.3. Pharmaceutical Interventions

Prepare, administer, store and document medications, reactions and outcomes according to laws, regulations and authorized health care provider orders and protocols.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
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| X                         | X                                    |                               | X                  |

#### Competencies

- 3.3.1. Identify and define terms related to drugs, pharmacology and medicines.
- 3.3.2. Identify drug classifications.
- 3.3.3. Recognize brand and generic names of prescription medications, over-the-counter drugs and herbal preparations.
- 3.3.4. Identify and interpret elements of a prescription.
- 3.3.5. Store drugs in regard to heat, light, moisture and security systems.
- 3.3.6. Describe the therapeutic value of the medication being taken and how to evaluate the individual’s outcome.
- 3.3.7. List and describe the routes of drug administration with various forms of drugs (e.g., tablets, suspensions, capsules), including parenteral medications.
- 3.3.8. Prepare and/or reconstitute medications as indicated on the prescription or medication order.
- 3.3.9. Document medication and immunization records and report errors.
- 3.3.10. Calculate medication dosages and infusion rates.
- 3.3.11. Administer medications ensuring the correct medication, dosage, route, time, person and method.
- 3.3.12. Recognize and communicate the potential side effects and adverse reactions to medical interventions and determine the individual’s level of understanding.
- 3.3.13. Identify causes for altered body states (e.g., hallucinogens, sensory deprivation) and corrective actions.
- 3.3.14. Recognize fluid and electrolyte imbalances, side-effects and adverse reactions.
- 3.3.15. Apply standard practices and procedures that prevent contamination of pharmaceutical products.
- 3.3.16. Follow pharmaceutical procedure when filling a syringe, breaking an ampule, reconstituting a sterile powder and injecting liquids into plastic bags.
- 3.3.17. Select and use vertical laminar flow and biological safety cabinets equipped with HEPA-filters to ensure sterile product mixing and specimen protection.
- 3.3.18. Fill a prescription by calculating the amount of the drug to dispense, identifying the number of days for the supply and documenting the dosage regimen from a medication order.
- 3.3.19. Follow verification processes for handling medications prepared by others and for identifying fraudulent prescriptions.

**Outcome 3.4. Emergency Interventions**

Respond to emergencies and natural disasters by performing emergency interventions and proper documentation.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               | X                  |

**Competencies**

- 3.4.1. Perform cardiopulmonary resuscitation (CPR), first-aid and automated external defibrillation (AED).
- 3.4.2. Control hemorrhage.
- 3.4.3. Recognize and respond to anaphylactic shock.

**Outcome 3.5. Nutritional Interventions**

Identify nutritional needs and communicate information to the individual and family member.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

**Competencies**

- 3.5.1. Describe the role and effects of carbohydrates, proteins, fats, electrolytes, minerals, vitamins and water in different body systems and life processes.
- 3.5.2. Calculate the energy of carbohydrates, proteins and fats.
- 3.5.3. Describe ergogenic aids and possible benefits and risks.
- 3.5.4. Calculate caloric needs of the individual and refer the individual to nutritional resources for optimal health and performance.
- 3.5.5. Provide diet and hydration guidelines to maintain optimal health.
- 3.5.6. Describe which drugs interact with certain foods.
- 3.5.7. Describe types of allergic reactions to foods and food intolerances.
- 3.5.8. Describe regional, cultural and religious food preferences.
- 3.5.9. Monitor intake and output when medically indicated.
- 3.5.10. Take anthropometric measurements (e.g., weight, height, body mass index [BMI], body fat percentage).

### **Outcome 3.6. Exercise and Rehabilitative Intervention**

Evaluate, define and perform training and therapies to enhance mobility and muscle strength and document.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
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| X                                | X   |                                      |                           |

#### **Competencies**

- 3.6.1. Complete a comprehensive fitness evaluation.
- 3.6.2. Evaluate kinesthetic awareness as related to functional movement.
- 3.6.3. Design and implement an individualized training program by using interval, continuous and circuit training techniques.
- 3.6.4. Calculate the differences in caloric costs between various exercise protocols (e.g., cardio versus resistance training, large versus small muscle groups).
- 3.6.5. Apply techniques to enhance neuromuscular flexibility (e.g., proprioceptive neuromuscular facilitations [PNF], static, dynamic and ballistic stretching techniques).
- 3.6.6. Apply techniques to enhance muscle strength, endurance and flexibility (e.g., isometric, isotonic, isokinetic, aerobic, strength, power and flexibility training).
- 3.6.7. Perform active, passive, assistive and resistive Range-of-Motion (ROM) on joints.
- 3.6.8. Use aquatic exercises for improvement of ROM, strength and cardiovascular benefits.
- 3.6.9. Modify physical activity to accommodate specific medical conditions and changes across the life span (e.g., asthma, sickle cell, diabetes, osteoporosis, skeletal-muscular disorders, age, pregnancy).
- 3.6.10. Fit ambulatory aids and perform gait training.
- 3.6.11. Apply protective taping, wrapping, padding and protective equipment to upper and lower extremities.
- 3.6.12. Employ techniques to disrupt the interpretation of pain.
- 3.6.13. Apply evidence-based therapeutic modalities (e.g., cryotherapy, thermotherapy, hydrotherapy, light therapy, electrotherapy).
- 3.6.14. Apply the FITT principle (i.e., frequency, intensity, time, type) to health and skill conditioning activities.

**Outcome 3.7. Dental Interventions**

Assist in the application of dental and oral interventions and document with dental terminology and symbols.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

**Competencies**

- 3.7.1. Explain the relationship between oral health and nutritional factors related to dentistry.
- 3.7.2. Summarize the uses and effects of tobacco, caffeine, alcohol, marijuana, cocaine and methamphetamines on the oral cavity and teeth.
- 3.7.3. Compare and contrast various specialties in dentistry (e.g., endodontic, periodontal, oral surgery, orthodontics, prosthodontics).
- 3.7.4. Identify instruments and supplies used in various dental procedures.
- 3.7.5. Identify dental emergencies.
- 3.7.6. Describe dental pain management.
- 3.7.7. Describe the science of radiation production, safety and protection.
- 3.7.8. Describe the composition, sizes, types, mounting and storage procedures of dental x-ray.
- 3.7.9. Describe common x-ray production and processing errors and their corrections.
- 3.7.10. Describe the paralleling and bisecting x-ray techniques and needed equipment.
- 3.7.11. Take intraoral and extraoral photographs and radiographs.
- 3.7.12. Compare and contrast common procedures and equipment used in pediatric and adult dentistry.
- 3.7.13. Prepare individuals for treatment.
- 3.7.14. Prepare dental materials for placement.
- 3.7.15. Perform basic dental chair-side assisting, including evacuation and transfer techniques.
- 3.7.16. Demonstrate in-office dental laboratory procedures.
- 3.7.17. Chart conditions of the oral cavity.

**Outcome 3.8. Surgical Interventions**

Prepare an individual for the surgical experience and assist in the surgical suite, special case management and documentation.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               |                    |

**Competencies**

- 3.8.1. Transport and position the individual for surgery.
- 3.8.2. Apply monitoring equipment.
- 3.8.3. Perform hand scrubbing, gowning and gloving.
- 3.8.4. Prepare surgical site and drape.
- 3.8.5. Handle surgical instruments with care and safety during cleaning, sterilization and/or disposal.
- 3.8.6. Pass various surgical instruments by type, function and name during surgical procedures.
- 3.8.7. Pass common supplies and equipment, such as suture material, sponges, dressings, drains, catheters and collection mechanisms.
- 3.8.8. Obtain and secure surgical specimens.

## Strand 4. Assistive Care

Learners will demonstrate the skills and knowledge to provide personal assistive care for the activities of daily living to a variety of individuals across the life span within their scope of practice.

### Outcome 4.1. Scope of Practice

Demonstrate the roles and responsibilities of assistive personnel and identify the medical specialists who treat disorders of each body system.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

### Competencies

- 4.1.1. Describe the guidelines of the governing body concerning abuse, mistreatment, neglect and misappropriation of an individual’s property.
- 4.1.2. Inform the supervisor of any changes in the individual’s condition.
- 4.1.3. Provide input to and work within an age-appropriate plan of care developed by the interdisciplinary team for each individual.
- 4.1.4. Describe the primary purpose of healthcare settings (e.g., long-term care facility [LTCF], acute care, home health).
- 4.1.5. Identify the medical specialists who treat disorders of each body system.
- 4.1.6. Identify body planes, directions, cavities, quadrants and regions.

### **Outcome 4.2. Therapeutic Communication and Interpersonal Skills**

Demonstrate communication techniques and behaviors when communicating with individuals and interacting with individuals with impairments and document.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
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| X                                | X   |                                      |                           |

#### **Competencies**

- 4.2.1. Describe non-verbal communication, including gestures, posture, touch, facial expressions, eye contact, body movements, avoidance and appearance.
- 4.2.2. Describe the importance of maintaining an individual’s personal space.
- 4.2.3. Describe the importance of empathy in interpersonal relationships and the need for kindness, patience and listening.
- 4.2.4. Maintain aids that promote oral, auditory and visual health (e.g., eye glasses, hearing aids, dentures).
- 4.2.5. Arrange food and utensils on the meal tray in a clock fashion for visually impaired individuals.
- 4.2.6. Position an individual for meals to avoid choking and assist in feeding.
- 4.2.7. Maintain a proper environment for eating (e.g., noxious odors, contaminated items, loud noises).
- 4.2.8. Provide aids to facilitate communication for speech impaired individuals (e.g., picture cards, slates, notepads).

### **Outcome 4.3. Pathogenic Microorganisms, Infection Control and Infection**

Use basic principles of infection control to prevent the growth and spread of pathogenic microorganisms and infection.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
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| X                                | X   |                                      | X                         |

#### **Competencies**

- 4.3.1. Describe the chain of infection (e.g., host, vectors, portal of entry).
- 4.3.2. Describe mechanisms for the spread of infection, including airborne, vector-borne, common vehicle, droplet and contact.
- 4.3.3. Describe methods of controlling or eliminating microorganisms and the importance of practices that hinder the spread of infection (e.g., hand washing, disinfecting care areas).
- 4.3.4. Use personal protective equipment (PPE) when encountering body fluids, potential of splashing, or respiratory droplets.
- 4.3.5. Demonstrate various decontamination techniques and procedures.
- 4.3.6. Demonstrate precaution guidelines.
- 4.3.7. Maintain isolation precautions.
- 4.3.8. Identify signs and symptoms of infection (e.g., fever, confusion, areas of redness, swelling, pain).

#### **Outcome 4.4. Hygiene**

Perform personal hygiene for individuals across the life span and document.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               |                    |

#### **Competencies**

- 4.4.1. Perform oral and denture care.
- 4.4.2. Perform personal hygiene (e.g., bathing, perineal care, shaving, shampooing).
- 4.4.3. Assist or dress and undress impaired individuals.
- 4.4.4. Perform nail care, foot soaks and observe skin for reddened or discolored areas and abnormalities.
- 4.4.5. Observe and report skin condition over boney prominences.

#### **Outcome 4.5. Ambulation and Mobility**

Assist in the safe ambulation and mobility of individuals across the life span continuum and document.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

#### **Competencies**

- 4.5.1. Describe risks of immobilization and take measures (e.g., apply anti-embolic stockings, breathing, turning) to prevent complications.
- 4.5.2. Apply assistive devices based on individual needs.
- 4.5.3. Operate wheelchairs, Geri Chairs and lifts.
- 4.5.4. Prepare an individual for ambulation with skid-proof footwear, use gait belt and encourage the individual to use assistive devices.
- 4.5.5. Demonstrate ambulation techniques for the use of walkers, crutches and canes.
- 4.5.6. Reposition slowly to avoid postural hypotension.
- 4.5.7. Support the individual on the affected side of the body to prevent falls or injury.
- 4.5.8. Position the individual in bed for comfort, to maintain proper body alignment and to decrease pressure on boney prominences.

**Outcome 4.6. Elimination**

Assist with elimination needs across the life span continuum and document.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               |                    |

**Competencies**

- 4.6.1. Describe changes in elimination related to the aging process.
- 4.6.2. Measure intake and output.
- 4.6.3. Describe the importance of and develop a toileting schedule to maintain the individual’s dignity, prevent falls and decrease skin irritation.
- 4.6.4. Identify signs and symptoms of constipation, diarrhea and gastro-intestinal or rectal bleeding.
- 4.6.5. Assist with elimination needs (e.g., bedpan, commode, urinal).
- 4.6.6. Maintain a closed urinary catheter system.

**Outcome 4.7. Psycho-social, Behavioral and Emotional**

Provide for psycho-social, behavioral and emotional development and assist individuals with disorders.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

**Competencies**

- 4.7.1. Engage an individual in structured social activities and interactions to orient to person, place and time.
- 4.7.2. Observe for overstimulation and situations requiring crisis intervention.
- 4.7.3. Describe the importance of quiet time and rest periods.
- 4.7.4. Promote independence, self-care and self-actualization.
- 4.7.5. Describe the importance of intimate/sexual relationships across the life span.
- 4.7.6. Redirect inappropriate behavior.
- 4.7.7. Describe the importance of providing time for an individual with development and physical disabilities to communicate and perform tasks.
- 4.7.8. Provide assistive care and support to clients experiencing alterations in psychosocial integrity.
- 4.7.9. Assist clients with appropriate coping mechanisms.

**Outcome 4.8. End-of-Life Care**

Provide physical, emotional and spiritual support to individuals and families at end-of-life.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    |                               |                    |

**Competencies**

- 4.8.1. Describe variations in advanced directives and responsibilities of healthcare providers.
- 4.8.2. Identify stages of reaction to death and dying (e.g., denial, anger, bargaining, depression, acceptance).
- 4.8.3. Describe the goal of palliative care and hospice.
- 4.8.4. Provide resources for an individual’s cultural, spiritual and religious needs.
- 4.8.5. Enable individuals to express their feelings and to control their care.
- 4.8.6. Perform postmortem care in compliance with legal guidelines and cultural, spiritual and religious preferences.

## Strand 5. Bioscience Research and Development

Learners will demonstrate the skills and knowledge of interpreting laboratory requests, using protective clothing and hazardous material containment, specimen collection procedures, a variety of laboratory testing and techniques and maintenance of laboratory equipment and supplies.

### Outcome 5.1. Handling, Preparation, Storage and Disposal

Follow standard operating protocols for handling, preparing, storing and disposing of specimens, supplies and equipment.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

### Competencies

- 5.1.1. Use standard operating procedures for the safe use of instruments, equipment and gas cylinders.
- 5.1.2. Prepare and interpret labels for chemicals, supplies and equipment.
- 5.1.3. Use chemical references to identify hazards associated with handling and storing chemical materials.
- 5.1.4. Neutralize acids, bases, or caustic solutions for handling and disposal.
- 5.1.5. Ensure clean room integrity using Standard Operating Procedures (SOPs).
- 5.1.6. Sample, monitor and record the environmental conditions of the facility (e.g. air quality, temperature, microbial contaminations).
- 5.1.7. Adjust, calibrate, maintain and perform systems diagnostics on laboratory equipment.
- 5.1.8. Maintain equipment logs and determine when to perform, implement, or schedule preventive maintenance and/or systems updates.
- 5.1.9. Verify expiration dates and lot numbers.
- 5.1.10. Implement a chemical inventory system that includes all pertinent information regarding stability, hazards and sensitivity.
- 5.1.11. Maintain an inventory system for manufactured products, including a monitoring system for the pilfering of materials.
- 5.1.12. Maintain separate in-processing, quarantine and release areas.
- 5.1.13. Monitor and maintain animal behavior, welfare and husbandry.

## Outcome 5.2. Foundations of Chemistry

Perform systematic and methodical application of general and organic chemistry principles to examine the structures, their functions, their binding to other molecules and the methodologies for their purification and characterization.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

### Competencies

- 5.2.1. Draw electronic configurations of elements, compounds and mixtures.
- 5.2.2. Use the periodic table to describe atomic structure and to characterize elements based on the functional group.
- 5.2.3. Differentiate between organic and inorganic compounds.
- 5.2.4. Use common and chemical nomenclature for organic and inorganic materials.
- 5.2.5. Write names and formulas for common compounds.
- 5.2.6. Explain mole, molarity, normality, percent weight per volume (w/v) and percent volume per volume (v/v).
- 5.2.7. Describe the chemical bonding and bond types, including ionic and covalent and the relationships that they have with physical state of materials.
- 5.2.8. Apply the concepts of stoichiometry and the laws of thermodynamics to chemical reactions.
- 5.2.9. Balance chemical reactions.
- 5.2.10. Define catalyst and identify materials used as catalysts.
- 5.2.11. Predict endothermic and exothermic characteristics of a chemical reaction.
- 5.2.12. Use naming systems, including common and International Union of Pure and Applied Chemistry (IUPAC) conventions.
- 5.2.13. Describe, use and calibrate precision weighing and measuring techniques (e.g., analytical balance, micropipette) that are based on the metric system.
- 5.2.14. Calibrate volumetric glassware (e.g. pipets, volumetric flasks and burets).
- 5.2.15. Calculate errors in various measurements based on data acquired using common laboratory equipment.
- 5.2.16. Apply standard rules for determining the number of significant figures in measurements and in the answers to corresponding calculations.
- 5.2.17. Convert units of measure from English to metric and vice versa.
- 5.2.18. Calculate the volume, temperature and pressure of gases using the ideal gas law, Charles Law and Boyles Law.

### **Outcome 5.3. Microbiology Testing and Technology**

Describe the morphology and process of reproduction of microorganisms important in clinical disease and biotechnology applications and perform assays as a diagnostic tool to detect the presence of a pathogen.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
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| X                                |   |                                      | X                         |

#### **Competencies**

- 5.3.1. Explain microbial taxonomy and classification systems and use them to identify microbial organisms.
- 5.3.2. Compare and contrast cellular structure and functions of prokaryotic and eukaryotic cells.
- 5.3.3. Explain bacterial metabolism, reproduction, cell structures and their functions.
- 5.3.4. Identify aerobic bacteria through morphological, physical and biochemical properties.
- 5.3.5. Describe the structure of viruses and differentiate between types.
- 5.3.6. Identify the components of a nucleotide and differentiate from nucleosides.
- 5.3.7. Explain virulence, pathogenicity and the factors that contribute to pathogenicity.
- 5.3.8. Describe types and features of passive and active transport systems.
- 5.3.9. Describe molecular behavior of large molecules, including carbohydrates, lipids and proteins.
- 5.3.10. Explain how chemical energy operates major cell processes (e.g., biosynthesis, movement, transport, growth).
- 5.3.11. Explain factors that affect and optimize rates of enzyme assay reactions.
- 5.3.12. Perform an enzyme-linked immunosorbent assay (ELISA) and interpret the results.
- 5.3.13. Perform biochemical assays of proteins, lipids, carbohydrates, nucleic acids and enzymes.
- 5.3.14. Perform bioassays for pathogens.
- 5.3.15. Distinguish uses and limitations of various assays.

### Outcome 5.4. Bio-Molecular Technology

Perform bio-molecular applications using knowledge of nucleic acid structure and function, DNA replication, transcription, translation, chromosome structure and remodeling and regulation of gene expression in prokaryotes and eukaryotes.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

#### Competencies

- 5.4.1. Predict and explain offspring genotypes and phenotypes using Mendel’s Laws and a Punnett square.
- 5.4.2. Explain alternative forms of transmission (e.g., non-Mendelian inheritance).
- 5.4.3. Explain, model and predict the three-dimensional shape, bonding patterns (covalent and hydrogen bonds) and antiparallel nature of deoxyribonucleic acid (DNA).
- 5.4.4. Model the Central Dogma Theory (e.g., replication, transcription, translation).
- 5.4.5. Describe the processes involved in gene regulation (e.g., histone acetylation, RNA stability, co-translational and post-translational modifications).
- 5.4.6. Discuss alternative types of gene expression (e.g., sex-limited, sex-linked, partial dominance, epistatic, pleiotropic).
- 5.4.7. Identify, isolate and manipulate peptides and proteins (i.e., primary, secondary, tertiary, quaternary).
- 5.4.8. Describe and perform the steps in creating a recombinant DNA molecule.
- 5.4.9. Isolate and purify nucleic acids, including chromosomal and extra-chromosomal DNA molecules.
- 5.4.10. Compare nucleic acids and chromosomal DNA molecules using a sequence database (e.g., Genebank®).
- 5.4.11. Perform and interpret the results of restriction enzyme digests.
- 5.4.12. Apply concepts of screening genetic expression, expression vectors and genetic libraries.
- 5.4.13. Perform and interpret the results of a Polymerase chain reaction.
- 5.4.14. Explain applications of Southern and Northern Blot Analysis.
- 5.4.15. Isolate, quantitate (e.g., Bradford assay) and characterize proteins (e.g., Western Blot analysis).
- 5.4.16. Perform antibiotic resistance cloning techniques, including vector preparation, transformation and selection.
- 5.4.17. Perform spectroscopy of biological materials explaining the principles behind the procedures, the purpose of a blank and determine the concentration of biomolecular samples.
- 5.4.18. Explain results from the Human Genome project and other sequencing projects and explain how gene sequencing is performed.
- 5.4.19. Perform gene analysis to determine the source of an isolated pathogen.
- 5.4.20. Explain the growing knowledge base regarding RNA and its role in gene expression.

### **Outcome 5.5. Laboratory Standard Operational Procedures**

Perform methods and techniques using protocols in order to conduct an experiment.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
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| X                                |   |                                      | X                         |

#### **Competencies**

- 5.5.1. Aseptically collect and prepare dry and wet samples for analysis, considering safety protocols.
- 5.5.2. Prepare and dispense stock reagents, buffers, media and solutions by calculating concentrations, adjusting factors such as pH and selecting purification techniques and containers.
- 5.5.3. Test and maintain the integrity of stains, reagents, chemicals and mounts.
- 5.5.4. Select and apply sterilization methods for reagents, buffers, media and solutions.
- 5.5.5. Perform laboratory measures by calculating and preparing a serial dilution, calculating quantities needed to perform a test analysis and calculating unit conversions and concentrations (graphing results).
- 5.5.6. Monitor physical properties of reagents, buffers, media and solutions for conductivity and resistivity, pH and turbidity and explain the significance of each.
- 5.5.7. Perform separation techniques, including chemical separations (chromatography), centrifugation, distillation and filtration and describe their principles and interpret the results.
- 5.5.8. Titrate liquids.
- 5.5.9. Transfer gases, liquids and solids from storage containers to equipment used in the laboratory.
- 5.5.10. Use aseptic laboratory techniques while working.
- 5.5.11. Perform a chromatography separation of a given mixture of substances.
- 5.5.12. Use electrophoresis to separate nucleic acids and determine molecular weight.
- 5.5.13. Comply with industry-based and required regulatory quality-assurance practices (e.g., quality control [QC], Good Laboratory Practice [GLP], Good Manufacturing Practice [GMP]) for documentation.

## Outcome 5.6.            **Culturing**

Perform experimental techniques used in cell biology to study cell growth, manipulation and evaluation.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

### Competencies

- 5.6.1. Identify the structure of cells and the functions of their components.
- 5.6.2. Explain classification, composition and preparation of culture media and prepare media for propagation.
- 5.6.3. Identify bacteriologic methods necessary for isolation and identification of organisms.
- 5.6.4. Operate centrifuge, microscope, compound microscope, spectrophotometer, incubator, colony counter, pipets and other basic microbiology and analytical equipment and using microscopes, examine biological specimens.
- 5.6.5. Explain the principles of microscopy and process a specimen for light microscopy.
- 5.6.6. Prepare, incubate and identify colonies microscopically and macroscopically (e.g., colonial morphology, staining procedures, biochemical).
- 5.6.7. Isolate, propagate, maintain and harvest pure cell lines.
- 5.6.8. Verify culture cell lines and determine the cause or causes of culture failures.
- 5.6.9. Explain the collection and handling of fungal, mycobacterial and viral specimens.
- 5.6.10. Explain Koch’s Postulates and their use in determining primary and secondary pathogens.
- 5.6.11. Describe how vectors (e.g., plasmids, transposons, viruses) are used to transform host and microorganisms.
- 5.6.12. Correlate bacterial binary fission with generation time.
- 5.6.13. Describe physical factors that affect microbial growth and identify a normal bacteria population growth curve.
- 5.6.14. Conduct a shelf-life study to determine physical change and biological growth.
- 5.6.15. Conduct a thermal death time study on an organism.
- 5.6.16. Calculate values of cell concentration for both batch and continuous cultivation.
- 5.6.17. Identify hormones used to stimulate cell growth and test for antibiotic susceptibility.
- 5.6.18. Explain how cell cultures can be used to assay viability and cytotoxicity.
- 5.6.19. Demonstrate cryopreservation techniques by freezing and thawing cells.

### **Outcome 5.7. Bioreactor Technologies**

Describe and perform bioreactor procedures (e.g., fermentation, sterilization).

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|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

#### **Competencies**

- 5.7.1. Maintain, classify and analyze types and classes of bioreactors and associated materials.
- 5.7.2. Explain the principles and importance of sterility in industrial fermentations.
- 5.7.3. Explain the temperature/pressure relationship of saturated steam to sterilization.
- 5.7.4. Explain the effect of entrapped air on sterilization effectiveness.
- 5.7.5. Compare sterilization methods using dry heat versus moist heat.
- 5.7.6. Demonstrate sterilization by micro-filtration.
- 5.7.7. Explain the effect of suspended solids in fermentation media on sterilization effectiveness.
- 5.7.8. Describe the sources and forms of energy, the relationship between heat and temperature, how heat is transferred and the factors that affect the rates of reaction in processing.
- 5.7.9. Describe the functions and physical properties of simple and complex carbohydrates, lipids and proteins in the fermentation process.
- 5.7.10. Describe the roles of enzymes as catalysts and the factors that affect enzyme activity in the fermentation process.
- 5.7.11. Describe the relationship of oxygen transfer rates to mass transfer.
- 5.7.12. Perform applications using benchtop fermentor and bioreactor systems.
- 5.7.13. Monitor microorganism growth and determine the viability of cells.

**Outcome 5.8. Biotechnology Research and Experiments**

Conduct a problem-based study, applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
|                           |                                      |                               | X                  |

**Competencies**

- 5.8.1. Identify research problems and structure a statistical experiment, simulation, or study related to the problem.
- 5.8.2. Design a research plan, including the significance of the problem, purpose, variables, hypotheses, objectives, methods of study and a list of materials.
- 5.8.3. Distinguish between dependent, independent and control variables in an experiment.
- 5.8.4. Establish and implement procedures for systematic collection, organization and use of data.
- 5.8.5. Select and apply sampling methods that appropriately represent the population to be studied.
- 5.8.6. Define the concepts of confidence limit and significant figures.
- 5.8.7. Document results of the experiment in a laboratory notebook, including statement of purpose, experimental design, observations, results, conclusions and next steps.
- 5.8.8. Compute measures of central tendency and dispersion to interpret results and draw conclusions.
- 5.8.9. Describe the relationships between variables using correlations and draw conclusions.
- 5.8.10. Create, interpret and use tabular and graphical displays and describe the data.
- 5.8.11. Draw conclusions based on observations and data analyses, recognizing that experimental results must be open to the scrutiny of others.
- 5.8.12. Prepare and present findings using scientific reports.

## Outcome 5.9. Clinical Laboratory Techniques and Procedures

Perform and interpret clinical laboratory techniques and procedures.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         |                                      |                               | X                  |

### Competencies

- 5.9.1. Maintain the integrity of a clinical sample, including patient/client identification and chain of custody and explain how to adhere to chain-of-custody guidelines when required (e.g., forensic studies, blood alcohol, drug screen).
- 5.9.2. Describe control substance procedures, protocols, documentation and labeling techniques.
- 5.9.3. Differentiate between aseptic and sterile procedures when collecting specimens and maintain bio-hazardous materials procedures (e.g., urine, feces, sputum, blood).
- 5.9.4. Discuss the methods of blood collection, specimen processing and labeling procedures and the potential problems that may occur.
- 5.9.5. Identify patient/client and inform them of the medical procedure to be performed.
- 5.9.6. Initiate intravenous (IV) therapy, blood withdrawal and arterial puncture using various techniques (e.g., butterfly, vacutainer, syringe, capillary puncture) according to current Occupational Safety and Health Administration (OSHA), Centers for Disease Control (CDC), Clinical Lab Improvement Act (CLIA) and the National Committee for Clinical Laboratory Standards (NCCLS) guidelines.
- 5.9.7. Identify resources needed for special procedures and demonstrate knowledge of special phlebotomy collection procedures (e.g., phenylketonuria [PKU], galactosemia, blood donations, blood cultures).
- 5.9.8. Differentiate between specimen collection, storage and handling techniques (e.g., temperature, light, time).
- 5.9.9. Determine order of draw and appropriate anticoagulants for ordered tests and correlate tube stopper colors with tube additives and their actions.
- 5.9.10. Identify complications of venipuncture (e.g., patient fainting, short draw, inadequate inversion, hemolysis, lack of blood flow, hematoma, petechia, nerve injury, mastectomy issues).
- 5.9.11. Prepare peripheral blood smears and discuss testing volumes and methods for minimizing excessive blood collection volumes.
- 5.9.12. Set up a procedure and collect an electrocardiograph (ECG).
- 5.9.13. Determine the general criteria for suitability of a specimen for analysis and reasons for specimen rejection and recollection.
- 5.9.14. Identify major routine tests performed in clinical lab sections (e.g., blood bank, chemistry, hematology, serology, microbiology, urinalysis).
- 5.9.15. Instruct patients/clients in the collection procedures for random, routine, non-blood specimen collection (e.g., clean-catch, mid-stream urine, stool specimens, semen, or sputum for testing.)
- 5.9.16. Perform Clinical Laboratory Improvement Act (CLIA) waived tests (e.g., dipstick or tablet reagent urinalysis, blood glucose by glucose monitoring devices, ovulation tests, urine pregnancy tests).
- 5.9.17. Assist with preparations for non-CLIA waived procedures.

## Strand 6. Health Information Management

Learners will demonstrate basic computer literacy, health information literacy and skills, confidentiality and privacy of health records, information security and basic skills in the use of electronic health records.

### Outcome 6.1. Health Information Literacy

Apply principles of systems operations used to capture, retrieve and maintain information from internal and external sources.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             |                    |

### Competencies

- 6.1.1. Define health information management (HIM) and differentiate among data, information and competency.
- 6.1.2. Differentiate between primary and secondary health data sources and databases.
- 6.1.3. Describe the architecture and data standards of health information systems.
- 6.1.4. Describe the principles of structure, design and use of health information (e.g., individual, comparative, reports, trended data).
- 6.1.5. Use health record data collection tools (e.g., input screens, document templates).
- 6.1.6. Recognize standard data definitions, vocabularies, terminologies, nomenclatures (e.g., SNOMED-CT), classifications (e.g., ICD9CM, ICD10, CPT) and relevant healthcare data sets (e.g., OASIS, HEDIS, UHDDS) as used in the organization’s health information systems.
- 6.1.7. Differentiate between the types and content of patient health records and the data collected (e.g., paper-based, electronic health records, personal health records).
- 6.1.8. Describe health record documentation requirements of external agencies and organizations (e.g., those specified by accrediting bodies, regulatory bodies, professional review organizations, licensure, reimbursement, discipline-specific “good practice”).
- 6.1.9. Describe typical internal organizational health record documentation requirements, policies and procedures.
- 6.1.10. Explain how to apply policies and procedures to ensure organizational compliance with regulations and standards, including Medicare and Medicaid.

**Outcome 6.2. Confidentiality, Privacy and Security**

Apply the fundamentals of confidentiality, privacy and security to communicate health/medical information accurately and within legal/regulatory bounds across the organization and between organizations.

An “X” indicates that the pathway applies to the outcome.

| Allied Health and Nursing | Exercise Science and Sports Medicine | Health Information Management | Medical Bioscience |
|---------------------------|--------------------------------------|-------------------------------|--------------------|
| X                         | X                                    | X                             |                    |

**Competencies**

- 6.2.1. Identify components of the court systems and distinguish between public and private law, civil and criminal law and tort, contract actions and the trial process.
- 6.2.2. Differentiate between types of evidence used in healthcare litigation, process of discovery and the permissible use of evidence in litigation, recognizing the elements of negligence and medical malpractice.
- 6.2.3. Explain and interpret regulatory requirements, standards of practice, legal responsibility, limitations and implications of actions and describe the appropriate avenues for reporting incidences of malpractice or negligence.
- 6.2.4. Identify what constitutes the authorized access, release and use of personal health data.
- 6.2.5. Distinguish between confidential and non-confidential information within the healthcare system and document, categorize and prioritize requests for personal health information according to internal/external privacy and confidentiality guidelines (e.g. Health Insurance Portability and Accountability Act [HIPAA]).
- 6.2.6. Use networks, including intranet and internet, according to security and privacy policies and procedures.
- 6.2.7. Maintain data integrity and validity within an information system.
- 6.2.8. Describe the possible consequences of inappropriate use of health data in terms of disciplinary action.
- 6.2.9. Implement administrative, physical and technical safeguards.
- 6.2.10. Describe elements that are included in the design of audit trails and data quality monitoring programs.
- 6.2.11. Compare and contrast the relevance of federal, state and private sector initiatives related to the privacy, security and confidentiality of health information technology.

### **Outcome 6.3. Electronic Health Records and Coding**

Perform functions within Electronic Health Records (EHRs) and Personal Health Record (PHRs) to ensure accurate information, retrieve information and maintain data.

An “X” indicates that the pathway applies to the outcome.

| <b>Allied Health and Nursing</b> | <b>Exercise Science and Sports Medicine</b> | <b>Health Information Management</b> | <b>Medical Bioscience</b> |
|----------------------------------|---|--------------------------------------|---------------------------|
| X                                | X   | X                                    |                           |

#### **Competencies**

- 6.3.1. Create and update documents within the EHR and PHR systems.
- 6.3.2. Locate and retrieve information in the EHR and other electronic sources for a variety of purposes.
- 6.3.3. Populate and use health data content.
- 6.3.4. Apply documentation management principals to ensure data quality, legal compliance and integrity.
- 6.3.5. Apply methods to ensure authenticity, timeliness and completeness of health data entries in electronic information systems.
- 6.3.6. Document profession-specific information in an EHR.
- 6.3.7. Identify methods to correct errors entered in an EHR.
- 6.3.8. Access reference material available through an EHR.
- 6.3.9. Identify the source of information entered in an EHR.
- 6.3.10. Resolve minor technology problems associated with using an EHR.
- 6.3.11. Follow access protocols for entry to an EHR.
- 6.3.12. Manage documents within the EHR and PHR, using filing and patient identification methodologies.
- 6.3.13. Complete health information management (HIM) functions (e.g., scanning, transcription, releasing information) in an electronic environment.
- 6.3.14. Perform procedural and diagnostic coding according to managed care policies and procedures (including third-party guidelines).
- 6.3.15. Describe the common insurance claim procedures and apply guidelines of documentation and processing to ensure federal, state and third-party insurance reimbursements are included and complete insurance claim forms.
- 6.3.16. Select accurate medical terminology to record and code charges and reimbursement aligned with regulatory and legal purposes.