STATE OF ILLINOIS

Model Programs of Study Guide

Agriculture, Food, and Natural Resources

COLLEGE & CAREER PATHWAYS

ICCB
ILLINOIS COMMUNITY COLLEGE BOARD

EdSystems
EDUCATION SYSTEMS CENTER at NORTHERN ILLINOIS UNIVERSITY

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About ICCB

In 1965, the Illinois General Assembly established the Illinois Community College Board to create a system of public community colleges that would be within easy reach of every resident. Today, the Illinois Community College System covers the entire state with 48 colleges and one multi-community college center in 39 community college districts. Community colleges serve nearly one million Illinois residents each year in credit and noncredit courses and many more through their public service programs.

Illinois' community colleges meet both local and statewide needs for education and workforce development through high-quality, affordable, accessible, and cost-effective programs and services. Learn more at iccb.org.

About EdSystems

Education Systems Center (EdSystems) is a mission-driven policy development and program implementation center based within Northern Illinois University. We work at the state level to create ecosystem and policy change while simultaneously working at the local level to create organizational change. This bi-directional approach allows us to align local efforts to state policy while elevating local experiences and learnings to state tables. Learn more at edsystemsniu.org.

Table of Contents

I. About the Model Programs of Study Guide

The Illinois Community College Board (ICCB) sponsored the development of the State of Illinois Model Programs of Study Guides in crucial industry areas as part of the Illinois State Plan for Strengthening Career and Technical Education for the 21st Century Act (also known as the Perkins V plan). This guide was developed in consultation and collaboration with the Illinois State Board of Education (ISBE) through a process led and facilitated by Education Systems Center at NIU (EdSystems). As further detailed in this guide, the process involved extensive research into labor market information and credential programs, and dialogue across secondary, postsecondary, and employer stakeholders.

The primary purposes and goals for the Model Programs of Study are to:

1. **Provide guidance and exemplars** for local pathway programs to adopt or customize as they develop programs of study for approval as part of Perkins V or Illinois' College and Career Pathway Endorsements.
2. **Establish a framework** for state agencies to develop and implement program supports.
3. **Identify priority dual credit courses** that are foundational to the industry sector's program of study and well-situated for statewide scaling and articulation.
4. **Define the competencies** that should be sequenced across a program of study course sequence to prepare students for the future of work in that industry area.
5. **Identify entry points** for employers to support coursework and work-based learning experiences.

Model Programs of Study supplement and complement other State of Illinois career and technical education and career pathway resources, including the ISBE Career Guide, State of Illinois Career Pathways Dictionary, Career Development Experience Toolkit, Recommended Technical and Essential Employability Competencies, State of Illinois Workforce Development Strategic Plan, and related state and regional data resources. School districts, community colleges, and their partners are encouraged to use this guide, state resources, and local program and course information to develop materials for student and family outreach.

The Model Programs of Study Guide in Agriculture, Food, and Natural Resources can be used as a reference in local planning processes. The guide presents and describes in detail each component of the sequence, including descriptions of the underlying research, analysis, and Advisory Committee input. In addition to the complete guide, a pathway map depicting the diagrams of the secondary and postsecondary sequences, as well as a table of the selected occupations, wages, and job growth, is available at the end of this document or at edsystemsniu.org/guides.

II. Development of the Model Programs of Study

Programs of study are a coordinated, non-duplicative sequence of academic and technical content at the secondary and postsecondary levels that culminate in a recognized postsecondary credential. The State of Illinois Model Programs of Study Guides are aligned with broader state policy goals to promote college and career readiness, including the state's Perkins V and ESSA plans (in particular, the College and Career Readiness Indicator), the Postsecondary and Workforce Readiness Act, the Dual Credit Quality Act, and the Illinois Career Pathways Dictionary.

Process for Development

Each Model Programs of Study was developed using a data-driven, backward-mapping approach that extended from the areas of job growth down through to the high school course sequence. The specific steps in this analysis included:

1. **Identifying high-priority occupations** in the industry sector that are high-skill, high-wage, and in-demand based on federal Department of Labor data for Illinois.
2. **Identifying promising postsecondary credentials** (degrees or certificates) that are broadly accessible to and through the Illinois community college system, and lead to high-priority occupations.
3. **Mapping the stackable degrees and certificates** that progress to promising credentials.
4. **Identifying strategic community college courses** that appear broadly among promising credentials, provide a solid foundation of knowledge essential to that industry sector, and are feasible for dual credit delivery.
5. **Mapping a course sequence from secondary through the first year of postsecondary** that incorporates strategic early college credit (including at least six early college credits in the career-focused course sequence) and is applicable to both Illinois secondary and postsecondary Perkins V requirements.
6. **Defining related technical competencies** for the foundational program of study courses that can be utilized to guide course development and postsecondary articulation.

Using data from the Department of Labor, Illinois Department of Employment Security, and MIT's Living Wage Calculator for the State of Illinois as a reference, the project team identified "high-priority occupations" as jobs with a positive growth outlook over the next 10 years, of high relative volume within that industry sector, and with median salaries that could sustain various family sizes within Illinois.[1] Occupations with median salaries higher than the living wage for 1 adult + 1 child ($39.63/hour) are considered as having a "high" living wage potential. Occupations with median salaries only higher than the living wage of 1 adult, no children ($22.86/hour) are considered as having a "medium" living wage

[1] U.S. Department of Labor, Employment and Training Administration (n.d.). "Explore Careers." CareerOneStop. Retrieved December 2023, from careeronestop.org/explorecareers. Illinois Department of Employment Security, "Long-Term Occupational Projections 2020-2030" and "Wage Information: Occupational Employment and Wage Statistics (OEWS) Statewide." Retrieved December 2023, from ides.illinois.gov. Amy K. Glasmeier, "Living Wage Calculator," Massachusetts Institute of Technology, 2024. Retrieved December 2023, from livingwage.mit.edu.

potential, and occupations with median salaries below the living wage of 1 adult, no children (less than $22.86/hour) are considered as having a "low" living wage potential.

The team identified as a "promising credential" any degree or certification that immediately prepares an individual for entry into or is a stackable for the identified high-priority occupations, then analyzed community college programs leading to these credentials from a sampling of six to ten colleges from across Illinois, representing a mix of urban, suburban, and rural institutions.[2] EdSystems analyzed and categorized all the career-focused and general education courses across the full sampling of the promising credential programs to determine which of these courses:

- are broadly common across multiple college programs in the sample,
- are likely accessible for dual credit opportunities considering student prerequisites and teacher credentialing requirements, and
- are generally transferable through Illinois Articulation Initiative or various articulation agreements.

This analysis and categorization process led to a recommended set of strategic career-focused and general education courses that provide a critical foundation for the program of study sequence.

Following this internal analysis, EdSystems and ICCB convened a stakeholder Advisory Committee of secondary, postsecondary, and private sector representatives to vet the recommendations and provide expertise and guidance on the development of the Model Programs of Study (see Appendix C). Over multiple webinars and feedback sessions across four months, the Advisory Committee and smaller working groups provided information about industry trends that may not be reflected in the Department of Labor or Illinois Department of Employment Security data, credentials and degrees that are emerging as most promising in the field, on-the-ground implementation considerations for secondary and postsecondary programs, and future of work implications for the sector. The Advisory Committee further informed important decision-points including adjusting the course map and promising credential endpoints, selecting strategic early college credit courses, and identifying key competencies for target courses lacking broad statewide articulation. The culmination of EdSystems' analysis and the input of the Advisory Committee is reflected in this guide.

[2] For the analysis of this guide, the community colleges surveyed were Black Hawk College, John Wood Community College, Joliet Junior College, Kaskaskia College, Lake Land College, Lincoln Land Community College, Parkland College, and Rend Lake College.

III. Priority Occupations and Promising Credentials

Agriculture, food, and natural resource (AFNR) occupations represent a broad range of occupations that are growing across Illinois, in a diverse range of urban, suburban, and rural contexts. As noted in Illinois' Economic Development plan, the concentration of Agribusiness and Agricultural Technology occupations is above average in 7 of our 10 Economic Development Regions in comparison to the nation.[3] This means that AFNR occupations are prevalent and growing statewide. Available occupations are highly regionalized, dependent on local context and natural/agricultural resources. Further, the state hopes to build from these abundant natural resources, noting that they "contribute to the state's economy by facilitating trade, attracting tourists, enhancing the quality of life for residents, and supporting a diverse agricultural industry."[4]

The Advisory Committee frequently emphasized that current postsecondary programs reflect the state of AFNR as it is currently, but that the sector is evolving technologically and philosophically in ways that will ultimately require new approaches for preparing students for the AFNR jobs of tomorrow. As such, it is increasingly important to cultivate a breadth of technical and essential employability competencies that emphasize adaptability and innovation for long-term success for students completing these pathways.

The deep connections that AFNR fields and occupations have both across the sector as well as with other sectors provide an opportunity to attract students who may have an interest in other subjects, such as geography or education. It also creates a challenge for identifying the most appropriate labor market information for certain roles. For example, operational and sales roles in agribusiness do not have their own code in the US Department of Labor data, so the agricultural sales role included in this guide is tied to more general sales data.[5] The Advisory Council did note that individuals need both sales-related skills as well as specialized expertise in relevant AFNR fields for agricultural sales roles.

Promising Credential Program Categories

The project team's analysis of promising credentials in Illinois community colleges for the AFNR sector led to an identification of four credential program categories or pathways:

7. **Guided transfer** programs are for students seeking university degrees commonly associated with AFNR occupations requiring advanced scientific knowledge, such as agricultural inspectors, soil and plant scientists, or conservation scientists. A guided transfer typically involves an Associate of Science degree that transfers to a bachelor's degree program or further professional degree.
2. **Agribusiness** credentials prepare students for a myriad of roles in agricultural businesses, including direct technical roles and applications as well as agricultural business management roles. While these credentials often culminate at the community college level, in some cases students could continue a trajectory to a bachelor's degree program at certain Illinois universities.
3. **Horticulture and plant science** credentials prepare students to enter various roles pertaining to plant, soil, and crop management, including landscaping-related occupations. While these credentials often culminate at the community college level, in some cases students could continue a trajectory to a bachelor's degree program at certain Illinois universities, particularly in pursuit of scientific roles.
4. **Animal Science** credentials prepare students for veterinary technician roles and then can build towards agricultural business applications of those skills, including animal husbandry.

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[3] Illlinois Department of Commerce and Economic Opportunity (2019, October 9). "A Plan to Revitalize the Illinois Economy and Build the Workforce of the Future." Retrieved April 2024, from dceo.illinois.gov/econplan2019.html.

[4] IBID

[5] U.S. Department of Labor, Employment and Training Administration (n.d.). "Occupation Profile: Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products." CareerOneStop. careeronestop.org/Toolkit/Careers/Occupations/Occupation-profile.aspx?keyword=Sales%20Representatives,%20Wholesale%20and%20Manufacturing,%20Except%20Technical%20and%20Scientific%20Products&onetcode=41401200&location=Illinois

The Advisory Committee emphasized that while shorter-term technical credentials exist within AFNR fields and occupations, the vast majority would not lead to entry-level employment in jobs without an associate degree as well. In many cases, employers will support their employees and new hires to obtain the most current technical credentialing in their ever-evolving context.

Diagram: **Postsecondary Opportunities**

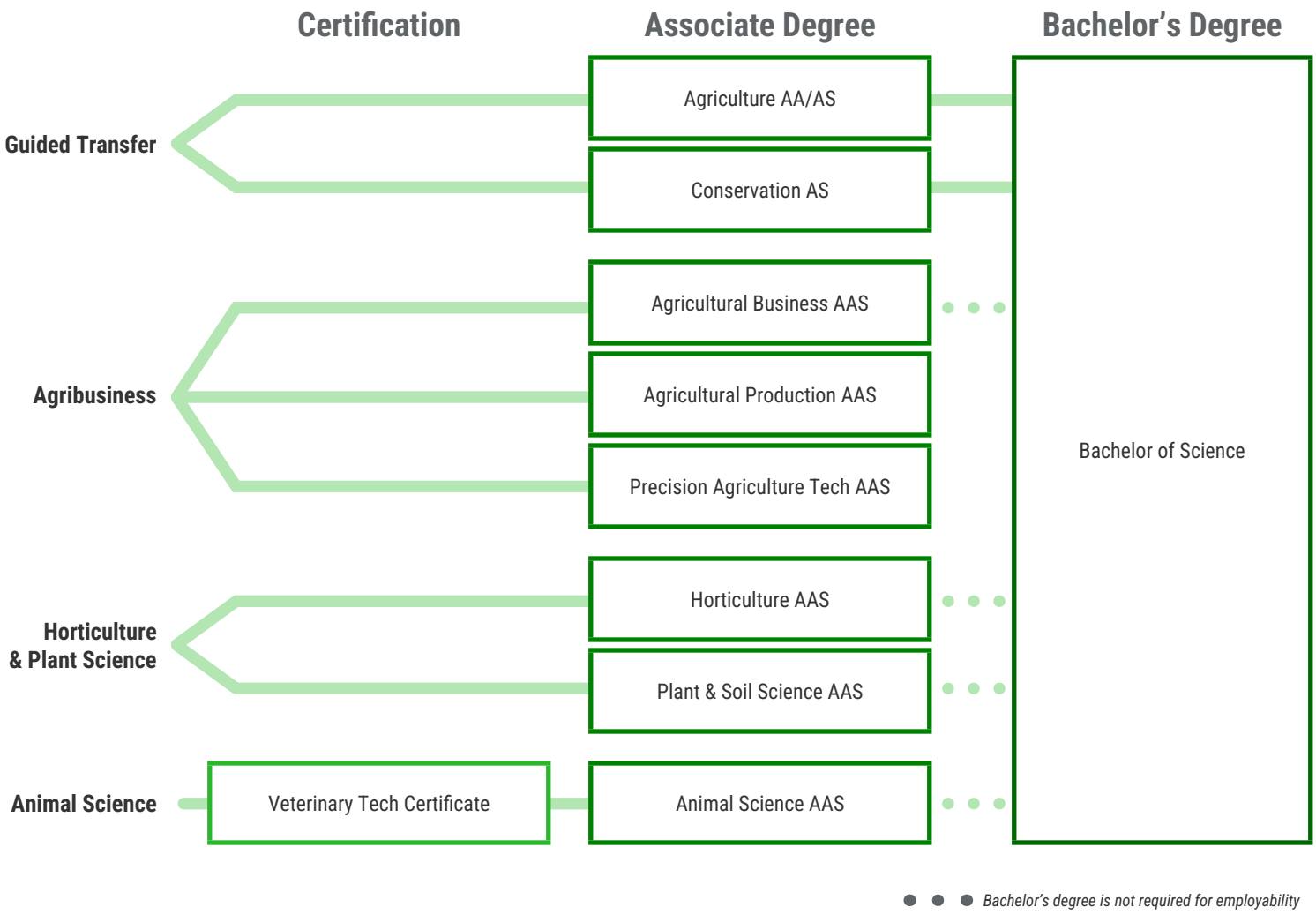

Table: **Selected Occupations, Wages, and Job Growth**

Program	Typical Job(s)	Living Wage Potential*	Median Hourly Wage**	IL Growth: Change over 10 years ***	IL Annual Job Openings***	Typical Educational Requirements
Guided Transfer	Conservation Scientists	Medium	$32.71	11.0%	98	Bachelor's Degree
	Agricultural Inspectors	Medium	$28.96	18.0%	95	
	Food Scientists and Technologists	High	$41.59	10.0%	129	
Agribusiness	Farmers, Ranchers, and Other Agricultural Managers	High	$46.61	2.0%	5,653	High School Diploma + Some College
	Agricultural Sales (Sales Representatives, Wholesale and Manufacturing)	Medium	$30.91	5.1%	6,952	
	First-Line Supervisors of Farming, Fishing, and Forestry Workers	Medium	$31.27	7.0%	77	High School Diploma
	Agricultural Equipment Operators	Low	$21.56	5.0%	329	
Horticulture & Plant Science	Soil and Plant Scientists	Medium	$33.05	10.0%	60	Bachelor's Degree
	Food Science Technicians	Medium	$25.15	9.0%	139	
Animal Science	Veterinary Technologists & Technicians	Low	$19.94	15.4%	364	Associate Degree

* Living wage potential is based on MIT's Living Calculator (livingwage.mit.edu) for Illinois in 2024. Occupations with median salaries higher than the living wage for 1 adult + 1 child ($39.63/hour) are considered as having a "high" living wage potential. Occupations with median salaries only higher than the living wage of 1 adult, no children ($22.86/hour) are considered as having a "medium" living wage potential, and occupations with median salaries below the living wage of 1 adult, no children (less than $22.86/hour) are considered as having a "low" living wage potential.

** Illinois Department of Employment Security (2022). Wage Information: Occupational Employment and Wage Statistics (Statewide). Retrieved April 2, 2024, from ides.illinois.gov/resources/labor-market-information/oews.html

*** Illinois Department of Employment Security. Employment Projections (Long-Term Occupational Projections 2020-2030). Retrieved April 2, 2024, from ides.illinois.gov/resources/labor-market-information/employment-projections.html

High-Priority Occupations

The high-priority occupations associated with each of the promising credential program areas are identified in the table entitled Select Occupations, Wages, and Job Growth. The Advisory Committee emphasized that there are diverse occupations across sectors that might not be considered a traditional AFNR role. For example, many agribusinesses in Illinois require sales teams who both understand the science behind the products and can promote the products to customers in a local, regional, and even international context. In identifying the high-priority occupations, the Advisory Committee sought to refine a manageable list that covers a breadth of occupations that both meet the desired criteria and are accessible through programs commonly found at Illinois community colleges.

Across AFNR pathways, there are many occupations meeting living wage and job growth criteria that do not require advanced education beyond an associate degree, with some exceptions. While select roles can be reached with a high school diploma, an associate degree leads to stronger entry wages and a path to higher-earning managerial roles with experience. The occupations affiliated with guided transfer pathways in conservation and agriculture meet the living wage and job growth criteria, and prepare students to transfer into programs that can lead to entry-level roles as well as stack to scientist or inspector roles.

While not depicted in the diagram, the Advisory Committee emphasized the importance of secondary programs in AFNR to connect to broader efforts to cultivate the teacher pipeline in Illinois, particularly agriculture educators. To that end, secondary districts and community colleges can consider how to combine experiences outlined in this guide and the Model Programs of Study Guide in Education to support that pipeline.

Levels of Credentials Needed

The levels of education needed for the various pathways in included in this guide are somewhat varied, but most high-priority occupations identified have a labor supply that overwhelmingly has some college education or higher. While individuals can enter into AFNR occupations with a high school diploma, roles with growth and strong wage potential require the specialized expertise gained through associate degree programs. Further, individuals can pursue a bachelor's degree, but such degrees are not necessary for the majority of high-priority occupations as outlined. As a result, this guide recommends learners earn at least an Associate of Science (AS) or Associate of Applied Science (AAS) degree.

IV. Programs of Study Sequence Description

Students should start a career-focused instructional sequence with an orientation course in 9th or 10th grade, with students engaging in career awareness and exploration in the middle school grades if possible. With this early start, students have more openings in their schedule to complete skill development and capstone options, obtain significant early college credits, earn valuable industry credentials, and potentially acquire a College and Career Pathway Endorsement before high school graduation.

As school districts and their community college partners develop a program of study sequence, they should ensure that the high school coursework enables all students in the pathways to attain Illinois' Recommended Essential Employability and Technical Competencies and the top relevant technical competencies (see Appendix A).

Diagram: **Career-Focused Instructional Sequence**

	GRADES 9–10 **Orientation**	GRADES 10–12 **Skill Development**	GRADE 12 **Capstone**	1ST YEAR* **Postsecondary**
Agribusiness	*Choose 1:* • Basic Agricultural Science • Intro to the Agricultural Industry	*Choose 1:* • Agriculture Business Management • Intro Economics of Food, Fiber, and Natural Resources	*Choose 1:* • Intro to Animal Science • Intro to Soil Science	Intro to Microcomputer Skills in Agriculture
Horticulture & Plant Science		*Choose 1:* • Horticulture Production & Management • Intro to Horticulture	*Choose 1:* • Intro to Soil Science • Intro to Crop/Plant Science	Intro Economics of Food, Fiber, and Natural Resources
Work-Based Learning	Career Exploration (2)	*Choose 1:* Supervised Agricultural Experience *or* Youth Apprenticeship		
	Team-Based Challenge (2)*; may be offered through Career and Technical Student Organizations including a FFA Career Development Event*			

KEY:
- *AP or dual credit course*
- *Dual credit course*
- *College & Career Pathway Endorsement*
- *Dual credit course with IAI*
- *Postsecondary course with IAI*

** If credit was already earned through an early college course, take the next requirement in the sequence or, if none, additional AAS or major courses*

High School Career-Focused Instructional Sequence and Work-Based Learning

The Model Programs of Study in Agriculture, Food, and Natural Resources prepares students for a variety of postsecondary options by introducing students to a broad range of careers in the field and highlighting a set of early college credit courses that support meeting the Illinois State Board of Education's Career and Technical Education (CTE) program matrix for agriculture, food, and natural resources while strategically positioning students for success in a breadth of community college programs.

Through the introductory and strategic early college credit courses, students will develop critical skills for application across AFNR pathways. It must be noted that more than any other career focused programs, the Illinois ecosystem for AFNR postsecondary courses has an extensive offering of Illinois Articulation Initiative (IAI) courses. These dozen or so AFNR courses with an IAI code are generally transferable between community college programs and many Illinois university programs.

While the Model Programs of Study progression in AFNR highlights two primary pathways (agribusiness and horticulture and plant science), the reality of AFNR pathways is at once broader and more complex than what can be reflected in any one guide. The agribusiness pathway both prepares students for postsecondary programs in agriculture while also strategically opening the door to related pathways such as animal science. Across AFNR postsecondary programs, introductory courses are common, providing students with a broad range of content knowledge and skills, from which point students can specialize in areas such as agribusiness, animal science, or horticulture. Thus, while the two secondary pathways highlighted here cannot fully encompass the full breadth of the eight AFNR pathways outlined in ISBE's CTE program matrix, they are strategically aligned with early postsecondary work that can position students to specialize in those pathways down the line, based on their interest. Through their postsecondary experience, students will become fully prepared to enter into the occupations described by earning promising credentials, including through guided transfer programs.

Orientation Coursework

At the secondary level, ISBE's CTE program matrix includes two courses that cut across all pathways: Basic Agricultural Science and Introduction to the Agriculture Industry. Secondary districts should offer both courses, as they may attract different students to AFNR pathways. Introduction to the Agriculture Industry provides students with the opportunity to learn about the breadth of AFNR pathways, in what serves as a survey course at the CTE Group 2: Introductory level. Also a Group 2 course, Basic Agricultural Science can be used to deepen a student's knowledge of the research and scientific principles underlying many AFNR fields of study, and can attract students who are interested in science and research more broadly. Advisory Committee members emphasized the importance of schools being able to demonstrate to students early on the breadth of pathways in AFNR, drawing in students who might be interested in science, business, and more.

To begin preparing for the College and Career Pathway Endorsements, students should also participate in multiple virtual and in-person visits to employer sites to better understand authentic industry environments and engage with professionals in the field. Students should hear from a variety of guest speakers in an array of [SECTOR] careers to better understand opportunities in the field. Through the orientation course, students should be prepared to document their own personalized career pathway that leads to a promising credential.

Skill Development Coursework

The skill development course recommendations diverge for the general Agribusiness and the horticulture and plant science pathways.

In the agribusiness pathway, the recommended course is either Agriculture Business Management (as a dual credit course addressing the recommended essential and technical competencies) or the similar

IAI course, Introductory Economics of Food, Fiber, and Natural Resources. These courses would fulfill the skills course requirements for the agribusiness systems pathway within ISBE's CTE program matrix and overlap with the course Introduction to the Agricultural Industry.

- Introductory Economics of Food, Fiber, and Natural Resources is common across a broad range of AFNR pathways at the postsecondary level, from agriculture to animal science to plant science. If at all possible, the Model Programs of Study encourages secondary districts to offer this course in collaboration with their local community college. However, the project team acknowledges that this IAI course may be difficult to implement as dual credit because it commonly requires a teacher to have a master's degree in agricultural education, agribusiness, agricultural economics, or other related fields of study in order to be credentialed by the college partner.
- Agriculture Business Management may be offered as an alternative strategic dual credit course, as it can cover many of the same topics such as policy and regulation, economic principles, and financial management. Agriculture Business Management is commonly offered at many community colleges with an AFNR program and is likely to be easier to implement both in terms of teacher credentialing.

In the horticulture and plant science pathway, the Model Programs of Study recommends either Horticulture Production and Management or Introduction to Horticulture (the latter ideally as an IAI dual credit course). As with the agribusiness pathway, there is overlap in content for these courses and the ISBE CTE course Basic Horticultural Science. If at all possible, secondary districts should work closely with their community college partners to offer Introduction to Horticulture as IAI dual credit, and there are examples of districts who have done so across Illinois. As an alternative, the dual credit course Horticulture Production and Management, widely available at most community colleges, could be offered as well and likelier easier to implement in terms of teacher credentialing.

To be on track to earn the College and Career Pathway Endorsements, regional high school and community college partners should ensure students have earn three to six early college credit hours through the skill development courses.

In either of the pathways tracts, districts should seek to integrate the required Supervised Agricultural Experience for students to gain valuable work-based learning experience common in AFNR programs of study. The benefit of this approach is that, upon completion of the skill development classes and the Supervised Agricultural Experience, students will have met both the course requirements and professional learning goals under ISBE's CTE program matrix and be aligned to the College and Career Pathway Endorsements, allowing them to further deepen or specialize their knowledge at the capstone level. Additionally, as students continue progressing through the work-based learning continuum, classroom instruction should be coupled with continued employer site visits, an opportunity for students to participate in a job shadow experience at an employer site, and clubs or challenges related to their program area. Team-based challenges should be completed either as activities embedded within course curriculum or through a student/extracurricular organization. Students should be encouraged to engage in student or professional AFNR organizations, including Career and Technical Student Organizations, to continue to build familiarity with the profession and pathways towards various career options.

Capstone Coursework

At the capstone level, the Model Programs of Study recommends that students further specialize by enrolling in courses either offered as IAI dual credit or as dual enrollment, where the student takes the course at the local community college. The Model Programs of Study emphasizes the value of striving to offer these courses as early college credit opportunities given that they are required across a breadth of postsecondary AFNR programs and will set students up to accelerate into their pathway of choice.

In the agribusiness pathway, two potential options for capstone courses include introductory courses in Animal Science or Soil Science. In the Horticulture and Plant Science pathway, districts should consider introductory courses in either soil science or crop and plant science, both of which are required across various plant systems postsecondary programs. The Advisory Committee noted a common barrier to offering these science courses as dual credit is the required lab components, particularly for IAI. The Model Programs of Study encourages school districts to offer the courses as dual enrollment or hybrid/virtual models that enable students to gain the skills they need and accelerate postsecondary success.

To be eligible for the College and Career Pathway Endorsements, all students should complete a career development experience of at least 60 hours in length and earn at least six or more early college credit hours, through a mix of both career-focused and general education coursework. Additionally, students should continue participation in clubs, professional organizations, or challenges related to their pathway.

Diagram: **General Education Instructional Sequence**

	GRADES 9–10 **Orientation**	GRADES 10–12 **Skill Development**	GRADE 12 **Capstone**	1ST YEAR* **Postsecondary**
Math	*Math sequence: highest-level course possible*	*Math sequence: highest-level course possible*	*Choose 1:* • **Transitional Math: Quantitive Literacy Statistics** • **General Ed. Math**	*Choose 1:* • **General Ed. Math*** • **Statistics**
English	*English sequence*	*English sequence*	*Choose 1:* • **Transitional English** • **English Composition**	*Choose 1:* • **English Composition*** • **Oral Communication**
Science	*Science sequence*	*Science sequence*	*Choose 1:* • **Biology** • **General Biology for Non-Majors**	*Choose 1:* • **Chemistry** • *Science Sequence*
Social Science	*Social science sequence*	*Social science sequence*	**Microeconomics**	*Choose 1:* • **Microeconomics*** • **Macroeconomics** • *Social Science Sequence*

KEY:
- *AP or dual credit course*
- *Dual credit course*
- *College & Career Pathway Endorsement*
- *Dual credit course with IAI*
- *Postsecondary course with IAI*

** If credit was already earned through an early college course, take the next requirement in the sequence or, if none, additional AAS or major courses*

High School General Education Courses

There are several critical considerations for general education coursework before graduating high school. The courses mentioned here are frequent requirements for many postsecondary promising credentials in agriculture, food, and natural resources, and enhance students' opportunities for postsecondary success in addition to the career-focused courses already delineated.

- In **science**, students should complete the standard sequence culminating in Biology as either an Advanced Placement or IAI dual credit course if possible.
- In **social science**, students prepared for college-level coursework in their senior year should enroll in Microeconomics s a dual credit or AP course, further deepening their foundation in business concepts and consumer behavior widely applicable to AFNR.
- In **math**, students should complete the highest-level course possible while in high school and be preparing for the General Education Math or Statistics course at the postsecondary level. Students that do not demonstrate readiness for an early college math course during their senior year of high school should enroll in Transition to Quantitative Literacy/Statistics, a transitional math course that will guarantee placement into postsecondary math courses.
- In **English**, students prepared for college-level coursework in their senior year should enroll in a dual credit English Composition or Advanced Placement English Language and Composition course if available. Students not prepared for college-level coursework should enroll in a transitional English course that guarantees placement into the partner community college's English Composition course.

The Advisory Committee discussed integrated curricula in core academic coursework, particularly science. For example, a Agriculture Biology course offered at Rolling Meadows High School applies an agriculture lens to life sciences (a graduation requirement). Due to their emergent nature, the committee determined such models should be highlighted for consideration but not yet wholesale endorsed.

First-Year Postsecondary Courses

The recommended first-year postsecondary courses build upon the knowledge and skills of the capstone level. The courses highlighted (Intro to Microcomputer Skills in Agriculture; Introductory Economics of Food, Fiber, and Natural Resources) are common across a range of AFNR programs and develop valuable content knowledge and skills for application in the field. As with high school programs, community colleges should pursue opportunities to integrate and align AFNR coursework and work-based learning opportunities. Students pursuing a guided transfer or Associate of Applied Science (AAS) should initiate or continue to take career-focused courses in the associate degree program or certificate sequence.

For general education course areas, students will take the required 100-level courses. Across disciplines, selected courses should be strategic for as many promising credentials and also transferable through IAI.

- In **science**: Chemistry
- In **English/ communications**: Oral Communication and English Composition, due to their frequency in promising credentials
- In **social science**: Microeconomics and Macroeconomics, particularly for students continuing in agribusiness.
- In **math**: Either General Education Math or Statistics

If the 100-level courses have been accomplished through early college credit, students will take the next required course in the subject or, if none, additional courses in their major.

V. Strategic Dual Credit Courses: Competency Descriptions

EdSystems and ICCB convened a stakeholder Advisory Committee of secondary, postsecondary, and private sector representatives to vet the Model Program of Study recommendations. A smaller working group further convened to identify key competencies for the targeted early college course currently lacking current statewide articulation. In AFNR, that was Agriculture Business Management.

Agriculture Business Management *Key Competencies*	
Business Design	Students can create comprehensive plans for different models of AFNR operations in order to guide business goals, objectives, and resource allocations.
Principles of Agricultural Economics	Students can identify and analyze the basic principles of economics and trade in order to manage inputs and outputs of AFNR businesses.
Business Operations & Personnel Management	• Students can assess and implement procedures used to recruit, train, and retain employees in order to create a sustainable pipeline of human resources for AFNR operations. • Students can identify and apply business management skills in order to conduct AFNR business operations in an efficient, legal, and ethical manner. • Students can use their understanding of verbal and written communication to effectively maintain relationships with employers, employees, and customers.
Policy & Regulatory Context	• Students can identify sources and seek out relevant and reliable information on current AFNR policies and regulations at different levels of jurisdiction (local, state and federal) in order to understand the impact of those policies on business operations. • Students can describe basic principles of agricultural law and taxes in order to examine the implications for AFNR operations.
Financial Management & Reporting	Students can develop and utilize financial and credit management tools in order to achieve AFNR business goals.
Sales & Marketing	Students can perform tasks and responsibilities related directly or indirectly to sales and marketing in order to develop marketing plans and accomplish goals of sale of AFNR products.

Appendices

A: Technical and Essential Employability Competencies for Agriculture, Food, and Natural Resources

The following technical and employability competencies for agriculture, food, and natural resources are from "Recommended Technical and Essential Employability Competencies for College and Career Pathway Endorsements," a document developed through an iterative process involving public-private steering committees established pursuant to the Postsecondary and Workforce Readiness Act in order to implement College and Career Pathway Endorsements.

Technical and Essential Employability Competencies for **Agriculture, Food, and Natural Resources**	
AFNR Systems & Integration	Students can identify and analyze the breadth, depth, and interconnectivity of AFNR systems in order to make sustainable and innovative management decisions.
Technology	Students can apply their understanding of relevant technology and tools to collect information and execute effective practices across AFNR systems.
Policy & Regulations	Students can seek out, analyze, and apply information about relevant public policy and regulations to manage their impact on AFNR production, processing, distribution, and management practices.
Society & Culture	Students can use their understanding of the local natural and cultural resources, food, and economic context to steward consumer education and connections to AFNR stakeholders.
Resource Stewardship	Students can identify and analyze essential resources in order to steward them and implement sustainable management practices.
Ethical Production	Students can apply their understanding of ethical standards and practices in order to produce, process, and distribute AFNR goods and services with integrity.
Research & Innovation	Students can apply research and critical thinking skills to design innovative practices that address complex challenges in AFNR operations and industries.
Health, Safety, & Compliance	Students can use their understanding of personal safety and environmental regulations to comply with health and safety requirements as well as maintain safe and proper use of AFNR tools and equipment.

B: Cross-Sector Essential Employability and Entrepreneurial Competencies

The following cross-sector competencies are from "Recommended Technical and Essential Employability Competencies for College and Career Pathway Endorsements," a document developed through an iterative process involving public-private steering committees established pursuant to the Postsecondary and Workforce Readiness Act in order to implement College and Career Pathway Endorsements.

Essential Employability Competencies	
Teamwork & Conflict Resolution	Students can use their understanding of working cooperatively with others to complete work assignments and achieve mutual goals.
Communication	**Verbal**: Students can use their understanding of English grammar and public speaking, listening, and responding, convey an idea, express information, and be understood by others. **Written**: Students can use their understanding of standard business English to ensure that written work is clear, direct, courteous, and grammatically correct. **Digital**: Students can use their understanding of email, keyboarding, word processing, and digital media to convey work that is clear, direct, courteous, and grammatically correct.
Problem Solving	Students can use their critical thinking skills to generate and evaluate solutions as they relate to the needs of the team, customer, and company.
Decision Making	Students can use their understanding of problem solving to implement and communicate solutions.
Critical Thinking	Students can use their understanding of logic and reasoning to analyze and address problems.
Adaptability & Flexibility	Students can use their understanding of workplace change and variety to be open to new ideas and handle ambiguity.
Initiative & Self-Drive	Students can use their understanding of goal setting and personal impact to achieve professional goals and understand personal impact.
Reliability & Accountability	Students can use their understanding of commitment, time management, and follow through to ensure that a professional team functions properly and meets collective goals.
Cultural Competence	Students can use their understanding of diversity and inclusion to communicate and work effectively across a multitude of abilities, cultures, and backgrounds.
Planning & Organizing	Students can use their understanding of time management to plan effectively and accomplish assigned tasks.

Entrepreneurial Competencies	
Principles of Entrepreneurship	Students can apply their understanding of the process and characteristics of business development and promotion in order to apply strategies of innovation to personal and professional business pursuits.
Innovation & Invention	Students can use their understanding of idea generation, design thinking, product and business development in order to introduce and process new and effective ideas.
Growth Mindset	Students can use their understanding of learning from challenges, set-backs, and failure in order to adapt strategies and continue efforts to achieve personal goals.

C: 2021 Advisory Committee Membership

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Program Advisor
Facilitating Coordination in Agricultural Education

Natasha Allan
Director for CTE
Illinois Community College Board

Brad Angus
Instructor
Joliet Junior College

Andy Baker
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Western Illinois University

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Associate Dean for Academic Programs, College of Agricultural, Consumer and Environmental Sciences; Professor, Human Development and Family Studies
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Dave Wietzrak
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Megan Wojtyla
Seed Advisor, Northern Illinois
BASF Agricultural Solutions

D: College and Career Pathway Endorsements Framework

The College and Career Pathway Endorsements system is a voluntary system for school districts to award endorsements on high school diplomas to graduates who have demonstrated readiness for college and careers. The following framework for the endorsement system is available as a PDF download.

College and Career Pathway Endorsements Framework

INDIVIDUAL PLAN

Each student completing an endorsement must have an individualized plan, which includes college planning linked to early understanding of career goals, financial aid, resume, and personal statement.

PROFESSIONAL LEARNING

Awareness, exploration, and preparation activities that provide opportunities for students to interact with adults in their workplace and gain essential employability and technical competencies.

9th	10th	11th	12th
At least 2 career exploration activities or 1 intensive experience		60 cumulative hours of paid or for credit, supervised caree development experience(s) with a professional skills assessment r	
At least 2 team-based challenges with adult mentoring			

CAREER-FOCUSED INSTRUCTIONAL SEQUENCE

2 years of secondary coursework or equivalent that include essential employability and technical competencies, at least 6 hours of early college credit, and articulation to a postsecondary credential with labor market value.

9th	10th	11th	12th
Orientation / Introduction Courses			
	Skill Development Courses		
			Capstone / Advanced Courses

ACADEMIC READINESS

Ready for non-remedial coursework in reading and math by high school graduation through criteria defined by the school district and local community college.

E: Illinois' Work-Based Learning Continuum

Illinois has a defined continuum of work-based learning opportunities, which spans from secondary to postsecondary. Components, defined in statute and the Illinois Career Pathways Dictionary, include career awareness, career exploration, team-based challenges, career development experiences, youth or pre-apprenticeships, and apprenticeships.

Work-Based Learning & Host Engagement Continuums

Illinois' continuum represents the many forms of work-based learning that grow in intensity depending on the model. However, this continuum is not intended to convey a fixed or ideal progression. As individuals learn through their work-based learning experiences, they may return to less intensive models to develop different skills or explore additional interests. Individuals should be supported to engage in these activities iteratively as they explore the multiple entry and exit points of career pathways.

Providing high-quality work-based learning requires strong partnerships between educators and regional employers. As the intensity of students' experiences progress, so too does the role of employer partners serving as host sites.

STATE OF ILLINOIS

Model Programs of Study in Agriculture, Food, and Natural Resources

Recommended Courses

	GRADES 9–10 Orientation	GRADES 10–12 Skill Development	GRADE 12 Capstone	1ST YEAR* Postsecondary
Agribusiness	*Choose 1:* • Basic Agricultural Science • Intro to the Agricultural Industry	*Choose 1:* • Agriculture Business Management • Intro Economics of Food, Fiber, and Natural Resources	*Choose 1:* • Intro to Animal Science • Intro to Soil Science	Intro to Microcomputer Skills in Agriculture
Horticulture & Plant Science		*Choose 1:* • Horticulture Production & Management • Intro to Horticulture	*Choose 1:* • Intro to Soil Science • Intro to Crop/Plant Science	Intro Economics of Food, Fiber, and Natural Resources
Work-Based Learning	Career Exploration (2)	*Choose 1:* Supervised Agricultural Experience *or* Youth Apprenticeship		
	Team-Based Challenge (2)*; may be offered through Career and Technical Student Organizations including a FFA Career Development Event*			
Math	*Math sequence: highest-level course possible*	*Math sequence: highest-level course possible*	*Choose 1:* • Transitional Math: Quantitive Literacy Statistics • General Ed. Math	*Choose 1:* • General Ed. Math* • Statistics
English	*English sequence*	*English sequence*	*Choose 1:* • Transitional English • English Composition	*Choose 1:* • English Composition* • Oral Communication
Science	*Science sequence*	*Science sequence*	*Choose 1:* • Biology • General Biology for Non-Majors	*Choose 1:* • Chemistry • *Science Sequence*
Social Science	*Social science sequence*	*Social science sequence*	Microeconomics	*Choose 1:* • Microeconomics* • Macroeconomics • *Social Science Sequence*

KEY:
- *AP or dual credit course*
- *Dual credit course*
- *College & Career Pathway Endorsement*
- *Dual credit course with IAI*
- *Postsecondary course with IAI*

** If credit was already earned through an early college course, take the next requirement in the sequence or, if none, additional AAS or major courses*

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EdSystems EDUCATION SYSTEMS CENTER at NORTHERN ILLINOIS UNIVERSITY
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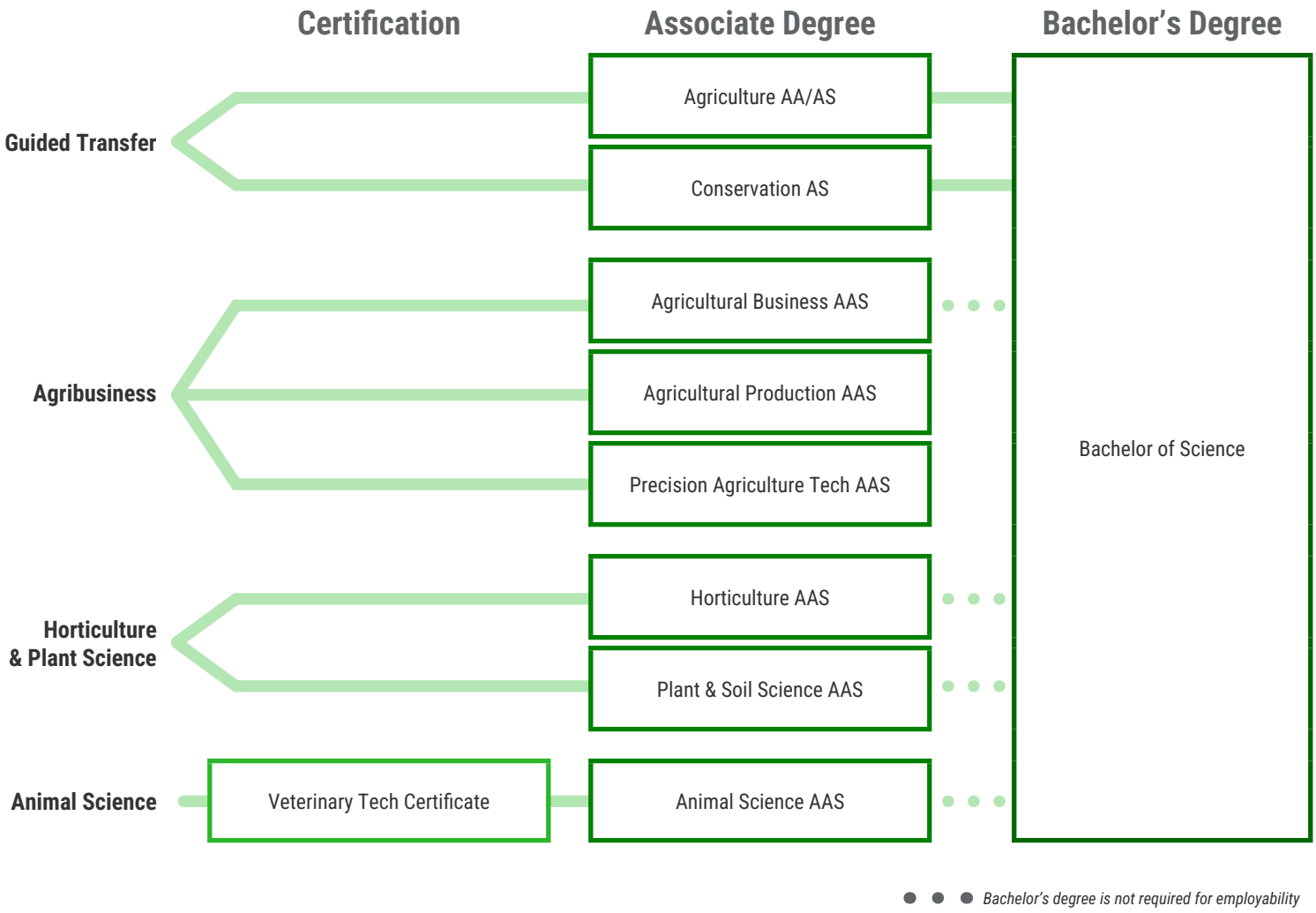
Postsecondary Opportunities



Selected Occupations, Wages, and Job Growth

Program	Typical Job(s)	Living Wage Potential*	Median Hourly Wage**	IL Growth: Change over 10 years ***	IL Annual Job Openings***	Typical Educational Requirements
Guided Transfer	Conservation Scientists	Medium	$32.71	11.0%	98	Bachelor's Degree
	Agricultural Inspectors	Medium	$28.96	18.0%	95	
	Food Scientists and Technologists	High	$41.59	10.0%	129	
Agribusiness	Farmers, Ranchers, and Other Agricultural Managers	High	$46.61	2.0%	5,653	High School Diploma + Some College
	Agricultural Sales (Sales Representatives, Wholesale and Manufacturing)	Medium	$30.91	5.1%	6,952	
	First-Line Supervisors of Farming, Fishing, and Forestry Workers	Medium	$31.27	7.0%	77	High School Diploma
	Agricultural Equipment Operators	Low	$21.56	5.0%	329	
Horticulture & Plant Science	Soil and Plant Scientists	Medium	$33.05	10.0%	60	Bachelor's Degree
	Food Science Technicians	Medium	$25.15	9.0%	139	
Animal Science	Veterinary Technologists & Technicians	Low	$19.94	15.4%	364	Associate Degree

* Living wage potential is based on MIT's Living Calculator (livingwage.mit.edu) for Illinois in 2024. Occupations with median salaries higher than the living wage for 1 adult + 1 child ($39.63/hour) are considered as having a "high" living wage potential. Occupations with median salaries only higher than the living wage of 1 adult, no children ($22.86/hour) are considered as having a "medium" living wage potential, and occupations with median salaries below the living wage of 1 adult, no children (less than $22.86/hour) are considered as having a "low" living wage potential.

** Illinois Department of Employment Security (2022). Wage Information: Occupational Employment and Wage Statistics (Statewide). Retrieved April 2, 2024, from ides.illinois.gov/resources/labor-market-information/oews.html

*** Illinois Department of Employment Security. Employment Projections (Long-Term Occupational Projections 2020-2030). Retrieved April 2, 2024, from ides.illinois.gov/resources/labor-market-information/employment-projections.html