

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

BUILDING ILLINOIS'
BIOECONOMY
CONSORTIUM PROGRAMS

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE



BUILDING ILLINOIS'
BIOECONOMY CONSORTIUM

THE BUILDING ILLINOIS' BIOECONOMY CONSORTIUM

MISSION

The Building Illinois' Bioeconomy (BIB) Consortium strives for the development of a well-trained quality workforce by merging the collective strengths and resources of each partner school with a network of committed regional employers. At the core of the consortium's mission is transforming the workforce to create a talent pipeline and meet industry needs through educational programs leading to bioeconomy careers. The Consortium spans across the state of Illinois, comprising Southern Illinois University Edwardsville (SIUE), Lewis and Clark Community College (L&C), Southeastern Illinois College (SIC), Lincoln Land Community College (LLCC), and Carl Sandburg College (CSC).

POPULATIONS SERVED

The Building Illinois' Bioeconomy Consortium benefits a variety of students. The recent high school graduate can find a worthwhile, engaging career through our bioeconomy aligned programs. Furthermore, our programs focus on providing career tracks for the non-traditional student, such as Trade Adjustment Assistance eligible workers, displaced, underemployed, or unemployed workers, veterans, and underserved minorities.

Building Illinois' Bioeconomy Consortium activities are funded through a \$10 million U.S. Department of Labor Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant.



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LETTER FROM SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE CHANCELLOR

Southern Illinois University Edwardsville is proud to be the lead institution for the Building Illinois' Bioeconomy Consortium. From specialized hands-on training at the National Corn-to-Ethanol Research Center and the Environmental Resources Training Center, to new focus areas in the Integrative Studies undergraduate major, to innovative online learning tools, seamless transfer pathways, and strong connections to industry partners, we are preparing students for successful careers in the growing bioeconomy.

However, this is not just an SIUE project, this is an Illinois project. From Lewis and Clark Community College in Godfrey to Southeastern Illinois College in Harrisburg, Lincoln Land Community College in Springfield, and Carl Sandburg College in Galesburg, Building Illinois' Bioeconomy Consortium's impact spans this great state. The Building Illinois' Bioeconomy Consortium has merged the strengths and resources of each partner school with a network of committed employers and stakeholders to establish transformative educational programs in bioeconomy sectors such as bioprocessing and water management.

The programs lead to in-demand careers and directly contribute to critical national challenges like energy security and economic growth, with consideration for the global building blocks of life: nutritious food, clean water, and clean air.

The Building Illinois' Bioeconomy Consortium is a shining example of Southern Illinois University Edwardsville's commitment to community engagement and enhancement. The Trade Adjustment Assistance Community College and Career Training grant and the partnerships it has fostered are an opportunity for SIUE to fulfill its vision of innovative and interdisciplinary programs that empower an array of individuals to achieve their full potential.

Randall G. Pembrook
Chancellor
Southern Illinois University Edwardsville

“The Building Illinois' Bioeconomy Consortium is a shining example of Southern Illinois University Edwardsville's commitment to community engagement and enhancement.”



LETTER FROM BUILDING ILLINOIS' BIOECONOMY CONSORTIUM PROJECT MANAGER

For the past three years, I've had the pleasure of serving as the Project Manager for the Building Illinois' Bioeconomy Consortium. Across the BIB Consortium, our goal is to empower students with the degrees, certificates, and training they need to achieve success in their desired career in the bioeconomy.

One of the first questions we always must answer is, "What is the bioeconomy, anyway?" To quote the specialized literature, "In its broadest sense, the bio-economy addresses the production and use of biological resources for conversion into commercial products, ranging from food and feed to bio-based products and bio-energy." (Institute for European Environmental Policy, 2015)

I tend to think primarily of agriculture, energy, manufacturing, and water, but it's also forestry, fisheries, food processing, and parts of the chemicals and biotechnology sectors, as well as business, management, communications, and education components related to these industries. It's food processing at Prairie Farms and Kraft Foods. It's biofuels production at Green Plains and Center Ethanol, water treatment at Metropolitan Sewer District, and agriculture communications at Osborn Barr. These are all real companies,

with real jobs, that our graduates are competitive in filling.

To address these employment needs, the BIB Consortium has created programs within the clusters of bioprocessing, biofuels, water management, restoration ecology, and process maintenance, as well as opportunities to articulate Associate of Applied Science (A.A.S.) degrees offered at community colleges into an innovative and interdisciplinary Integrative Studies Baccalaureate degree offered at SIUE.

We're filling the jobs of today while also preparing for the jobs of tomorrow. We are preparing workers for jobs that can't be outsourced, using homegrown, domestic fuel and products made from sustainable, renewable resources. We have the opportunity to build upon our collective strengths and develop the bioeconomy for the benefit of our students and for our community.

Courtney Breckenridge
Project Manager
Building Illinois' Bioeconomy Consortium

“ Across the BIB Consortium, our goal is to empower students with the degrees, certificates, and training they need to achieve success in their desired career in the bioeconomy. ”



ABOUT BUILDING ILLINOIS' BIOECONOMY CONSORTIUM

The BIB Consortium is a collaboration between five Illinois postsecondary educational institutions, made possible through funding from a U.S. Department of Labor grant. The Consortium is dedicated to transforming the workforce to create a talent pipeline and meet industry needs through flexible education and training programs that lead to in-demand, skilled, and high-wage jobs in the bioeconomy.



**Lewis and Clark
Community
College**



**Lincoln Land
Community
College**



**Carl Sandburg
College**



Bioprocess

Converting organic matter or waste into products that we use every day, like fuels or plastics



Bioenergy

A form of bioprocessing focused on turning organic matter into fuel



Process Maintenance

Operation of both machine and computer process systems in manufacturing facilities



Water Management

Treatment of waste or drinking water in a government or private facility, as well as in agriculture watersheds



Restoration Ecology

The preservation and restoration of natural environments like forests and plains

ABOUT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Southern Illinois University Edwardsville, accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools, awards degrees in 43 undergraduate and 67 graduate programs in the Arts and Sciences, Business, Education, Engineering, and Nursing. The Schools of Dental Medicine and Pharmacy award doctoral first professional degrees in Dental Medicine (DMD) and Pharmacy (PharmD). The Schools of Nursing and Education award doctoral degrees in Nursing Practice (DNP) and Educational Leadership (EdD). SIUE serves with these academic offerings and additional outreach programs a diverse student body of more than 14,000, and is situated in Madison County, which includes the second largest urban area in IL outside of Chicago, and is considered part of Metro East (the eastern suburbs of the Greater St. Louis IL-MO area).

National Corn-to-Ethanol Research Center Internship Programs

Environmental Resources Training Center Training Programs



Civil Engineering - Best Practices in Stormwater Management

Integrative Studies - Bioprocess Management, Bioprocess Science, Industrial Bioprocess



Visit www.siu.edu/admissions or www.buildingillinoisbio.com to connect with an admission specialist or a case manager and to enroll today

ABOUT THE BIOECONOMY

As mentioned in the *Federal Activities Report on the Bioeconomy* issued in 2016, “bioeconomy” is a popular phrase used broadly in today’s energy and agribusiness conversations, and emphasizing the integral role of abundant, sustainable, domestic biomass in the U.S. economy. The bioeconomy can help preserve the nation’s water and energy resources, reduce dependence on foreign oil, mitigate CO₂, increase the United States’ food and feedstock resources, and provide high-paying rural and urban jobs.

The benefits of the bioeconomy in improving the quality of life and creating jobs have been acknowledged both in the United States and abroad. The member countries of the United Nations, including the United States, have committed to the use of bio-based fuel in conjunction with higher bio-based blends, and recognize the environmental and economic potential for bioproducts, biomaterials, and renewable chemicals which are key components of the bioeconomy.

Southern Illinois University Edwardsville offers high quality and convenient training to support a skilled workforce contributing to the bioeconomy. The training programs related to the bioeconomy at Southern Illinois University Edwardsville, specifically providing a combination of credentials and hands-on experiences in bioprocess, process maintenance, bioenergy, and water management, prepare individuals for entry to mid-level positions and provide professional development in the bioeconomy sector.

SIUE’s National Corn-to-Ethanol Research Center is not only a premier provider of analytical and commercial validation services for biofuels and

bio-based materials to industry, government, and academic clients in its state-of-the-art laboratories and pilot plant facilities, but also a significant contributor to workforce education through internship, on-the-job training, and fellowship programs.

SIUE’s Environmental Resources Training Center features fully equipped drinking water and wastewater analysis labs and treatment plants, and for almost 40 years has been the Illinois Environmental Protection Agency’s designated center for water management training and a trusted water science education partner for regional employers.

The academic program at the core of the TAACCCT grant and its innovative approaches is the Integrative Studies program. It allows students to combine two to three areas of study, for example: biology and chemistry, with a focus on fermentation processes, for a bioprocess science pathway; biochemistry and engineering, for an industrial bioprocess pathway; and biochemistry and management, for a bioprocess management pathway.



BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

THE NATIONAL CORN-TO-ETHANOL RESEARCH CENTER (NCERC)



NCERC at SIUE offers students opportunities to gain a direct connection to the bioeconomy through state-of-the-art laboratories and pilot plant facilities, access to industry research and development, and relationships with corporate and startup clients who contract with NCERC for analytical and commercial validation services.

NCERC MISSION:

To facilitate the commercialization of biofuels, biochemicals, biomaterials, and bioproducts through research with collaborative or contractual partners, while training the bioeconomy workforce of today and tomorrow

NCERC ACTIVITY AREAS:

- **Advocacy:** To advocate to consumers and elected officials the benefits of bioenergy and the bioeconomy
- **Commercialization:** To facilitate the commercialization of new technologies for producing biofuels, biochemicals, biomaterials, and bioproducts more effectively
- **Research:** To utilize relationships with government, industry, academia, and trade to conduct both private sector and grant funded research
- **Education:** To develop and provide hands-on training to prepare the bioeconomy workforce of today and tomorrow

As a center operating within a public university system and conducting research both through contractual projects for the private sector and in collaborative partnerships with government agencies, NCERC has a history of success, with more than 65 biotechnologies developed now in the commercial marketplace and billions of dollars in related economic impact.

NCERC Project Overview

	Corn-to-Ethanol		Advanced Biofuel and Biochemical		Total
	Lab	Pilot Plant	Lab	Pilot Plant	
Scale	250ml to 1,500L	22,000L	250ml to 1,500L	22,000L	
Number of projects	141	59	36	34	270

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

THE NCERC'S LABORATORIES

By facilitating and offering groundbreaking research across all bio-based processing markets, NCERC has a lasting impact on shaping the renewable fuels industry and beyond.

NCERC boasts fully-equipped analytical and fermentation laboratories.



NCERC's analytical laboratory provides advanced testing of the biochemical process through liquid chromatography tandem mass spectrometry (LC-MS/MS), high performance liquid chromatography (HPLC), and near infrared (NIR) analysis. Quality assurance and quality control (QAQC) experts work closely with NCERC partners and clients in the analytical laboratory to ensure superior results that meet and exceed industry standards.

NCERC's fermentation laboratory offers a cutting edge environment for the evaluation of potential fermentation products at flask scale and in 5 liter fermenters. The front end process in the fermentation laboratory is comparable to runs in the pilot plant, and includes grain grinding, slurry treatment, liquefaction, saccharification, and fermentation. The back end processes are modeled as specified by clients.



BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

THE NCERC'S SCALABILITY

NCERC also offers **scalability**, or the option for clients to take their process from the laboratory to intermediate scale to pilot scale in one facility, using the fermentation suite and the pilot plant.



NCERC's fermentation suite offers companies from around the world, from start-ups to Fortune 50, opportunities to find new ways to increase yield, optimize processes, and test new technologies. The fermentation suite is fully equipped for the evaluation of potential fermentation products in 30, 150, and 1500 liter fermenters. The fermentation suite boasts pharmaceutical grade, steam sterilizable vessels in a controlled environment that can be isolated to handle sensitive materials.

NCERC's pilot plant is a modern 24,000 square-foot facility, with a modular, plug-and-play design, and can be adapted to meet the needs of most biorefinery and many bioproducts projects. This pilot plant, equivalent to a 1/250th scale ethanol plant, is equipped to handle a variety of feedstocks, operates at a 100-400 bushel per day capacity, and offers continuous or batch run operation. A Siemens PCS 7 v 8.2 distributed control system, including a SIM-IT digital twin for training and research simulation, offers data to analyze processes, technology, and design.



BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

NATIONAL CORN-TO-ETHANOL RESEARCH CENTER INTERNSHIP PROGRAMS

The **NCERC internships**, open for students at Southern Illinois University Edwardsville as well as from the partner community colleges of the BIB Consortium, are applied, hands-on learning experiences that gives students – and employers – a competitive workforce advantage. NCERC addresses numerous workforce challenges, from entry-level workforce development to custom corporate training.

Duration varies

Internship experiences available for credit or non-credit



ACTIVITIES

Students work side-by-side with veteran engineers, operators, and scientific analysts to gain:

- Exposure to state-of-the-art equipment and instrumentation in the NCERC laboratories, fermentation suite, and pilot plant
- Advanced process control knowledge through Siemens simulation (SIMIT) and live Siemens PCS 7 training
- Technical and professional skill development, including troubleshooting, teamwork, and soft skills training, in a real-life industrial setting

CAREER OPPORTUNITIES

- Biofuels or Biomass Plant Technician or Manager
- Bioprocess or Process Engineer
- Production and Quality Control Systems Manager
- Materials or Environmental Scientist or Specialist

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

DEPARTMENT OF CIVIL ENGINEERING COURSEWORK

Best Practices in Storm Water Management - The stormwater related coursework prepares Civil Engineering students at SIUE to work in municipal governments or in consulting firms providing engineering services to municipalities or private developers. Upon successful completion of the sequence of three courses, students become able to use appropriate design guides and engineering standards for the stormwater management system, to design and develop major components of stormwater systems, incorporating green infrastructures for low impact development, and to perform computer modeling and analysis of stormwater systems.

COURSES

CE 315 Fluid Mechanics

This course addresses the basic principles of conservation of mass, momentum and energy in fluid systems, dimensional analysis, open-channel flow, incompressible flow, and boundary layers.

CE 416 Engineering Hydrology

This course discusses hydrological processes and their relationship to the design of structures for the control and management of water resources, including rainfall-runoff relationship, probability and frequency analysis, and surface water hydrology.

CE 492 Stormwater Management

This course addresses storm water management in terms of both quantity and quality, including modeling for stormwater management system, engineering principles, and planning and design of green infrastructures for low impact development.



CAREER OPPORTUNITIES

- Water Resources Engineer
- Municipal Engineer
- Environmental Engineer
- Project Engineer
- Construction Engineer

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

ENVIRONMENTAL RESOURCES TRAINING CENTER TRAINING PROGRAMS

Certificate of Completion: Water Quality Control Operations - The Water Quality Control Operations program is a one-year, full-time program of study leading to a Certificate of Completion. Classes meet Tuesday through Friday (8:00 a.m. to 4:30 p.m.) for nine months starting mid-August each year. During the summer, students complete a 10 week internship program, where they work five weeks at a drinking water treatment plant and five weeks at a wastewater treatment plant. Upon completion of the full year program, students are eligible to take Illinois and Missouri certification exams to become certified as entry-level public water supply or wastewater treatment system operators.

1-year duration of studies

Non-credit



COURSES

- **ERTC 101 Wastewater Operations I**
- **ERTC 102 Water Supply Operations I**
- **ERTC 103 Water Quality Laboratory I**
- **ERTC 105 Mechanical Maintenance**
- **ERTC 106 Water Quality Math and Science**
- **ERTC 201 Wastewater Operations II**
- **ERTC 202 Water Supply Operations II**
- **ERTC 203 Water Quality Laboratory II**
- **ERTC 205 Electrical/Instrumentation Maintenance**
- **ERTC 207 Water Quality Communications**
- **ERTC 208 System Maintenance**
- **ERTC 300 Supervised Work Study**
(40 hours per week for 10 weeks)

CAREER OPPORTUNITIES

- Water or Wastewater Treatment Plant Operator or Technician
- Water or Wastewater Treatment Plant Superintendent or Manager
- Distribution System or Collection System Operator or Manager
- Laboratory Technician or Manager
- Water Resource Specialist
- Public Works Director

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

ENVIRONMENTAL RESOURCES TRAINING CENTER TRAINING PROGRAMS

Various Certifications: Water and Wastewater Treatment Systems - Courses at ERTC are designed to assist individuals interested in preparing to enter a career in drinking water and wastewater treatment systems or to pursue further education to upgrade job skills, obtain advanced certification levels, and prepare for career advancement. The demand for safe drinking water and quality recreational water is continually rising, and the Illinois Environmental Protection Agency has indicated a statewide need for as many as 400 additional operators each year.

COURSES

In addition to the Water Quality Control Operations program, coursework leading to certifications at ERTC at SIUE includes:

Self-Study Courses: These courses allow trainees to progress through materials and assignments at their own pace as well as receive feedback and grades from ERTC staff

- Water Supply Self-Study Courses
- Wastewater Treatment Self-Study Courses

Cross-Connections Control: Current Illinois Environmental Protection Agency Cross-Connection Control Device Inspector Certification requires a four day training course which deals with rules and regulations, hands-on practice testing of different types of backflow devices, and proper maintenance and repair. Since 1983, ERTC has offered approximately 400 Cross-Connection Control training courses for thousands of trainees.

Daytime and Evening Workshops: ERTC offers a wide array of water and wastewater continuing education opportunities which qualify participants for various Illinois and Missouri Environmental Protection Agency examinations. For a full list of training options: www.siu.edu/ertc/course_descriptions.shtml



CAREER OPPORTUNITIES

- Water or Wastewater Treatment Plant Operator or Technician
- Water or Wastewater Treatment Plant Superintendent or Manager
- Distribution System or Collection System Operator or Manager
- Laboratory Technician or Manager
- Water Resource Specialist
- Public Works Director

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

BACHELOR'S DEGREE IN INTEGRATIVE STUDIES

Integrative Studies at SIUE is an interdisciplinary program geared toward meeting each student's personal, academic, and career goals, as well as providing knowledge and skills to meet the needs of emerging professions.

This program provides students the opportunity to widen their perspectives by exploring and making connections between different fields of study. Students design their own program of study in consultation with an academic advisor, and in doing so take responsibility for their education and career planning.

The flexibility of the Integrative Studies program makes it appropriate for traditional students, students transferring from BIB Consortium partner community colleges and other regional colleges, as well as working professionals seeking to earn a baccalaureate degree.

Three focus areas have been devised as part of the BIB Consortium:

- **Bioprocess Management** combines coursework from biochemistry and business administration to prepare students for positions in project management, quality control, and environmental assessment in the bioenergy and bioprocess industries.
- **Bioprocess Science** combines coursework from biology and chemistry to prepare students for careers as scientists and analysts in the sectors related to sustainable energy and renewable biological resources.
- **Industrial Bioprocess** combines coursework from mathematics and engineering to prepare students for technical positions in the bioprocess and process technology industries.

These three focus areas give students opportunities to take coursework for acquiring technical and scientific expertise needed for industrial and technology settings, as well as to gain valuable hands-on experience and training provided through paid and unpaid internships at the nationally recognized facilities at NCERC.



BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

BACHELOR'S DEGREE IN INTEGRATIVE STUDIES: BIOPROCESS MANAGEMENT

Fall Semester		Spring Semester	
Year 1		Year 1	
BIOL 140 Human Biology	3	BIOL 250 Bacteriology	4
CHEM 120a General Organic and Biological Chemistry I	3	CHEM 120b General Organic and Biological Chemistry II	3
CHEM 124a General Organic and Biological Chemistry I Lab	1	CHEM 124b General Organic and Biological Chemistry II Lab	1
ECON 111 Principles of Macroeconomics (BSS)	3	ECON 112 Principles of Microeconomics (BSS)	3
ENG 101 English Composition I	3	ENG 102 English Composition II	3
ACS 101 Public Speaking	3		14
	16		
Year 2		Year 2	
CHEM 296 Introduction to Chemical Problems OR BIOL 493 Special Problems in Biology	0-1	CHEM 296 Introduction to Chemical Problems OR BIOL 493 Special Problems in Biology	0-1
ACCT 200 Fundamentals of Financial Accounting	3	BIOL 330 Environmental Health and Waste Management	3
MATH 120 College Algebra	3	MS 250 Mathematical Methods for Business Analysis	3
RA 101 Reasoning and Argumentation	3	QR 101 Quantitative Reasoning	3
Breadth Fine and Performing Arts (BFPA)	3	Breadth Humanities (BHUM)	3
Elective	2-3		15
	15		
Year 3		Year 3	
CHEM 480 Fermentation Science I	3	CHEM 482 Fermentation Science II	3
CHEM 481 Fermentation Science I Lab	1	CHEM 483 Fermentation Science II Lab	1
CHEM 396 Introduction to Research OR BIOL 493 Research in Biology	2	CHEM 496 Chemical Problems OR BIOL 493 Research in Biology	2
MGMT 330 Understanding the Business Environment	3	MGMT 331 Managing Group Projects	3
MS 251 Statistical Analysis for Business (BICS)	4	PROD 315 Operations Management	3
Elective	3	MGMT or PROD course++	3
	16		15
Year 4		Year 4	
INTG 300 Foundations of Integrative Studies	3	INTG 499 Integrative Studies Senior Project	3
CHEM 484 Fermentation Science III	3	Elective / Global Cultures (EGC)	3
CHEM 485 Fermentation Science III Lab	1	Elective / U.S. Cultures (EUSC)	3
MGMT or PROD course	3	Leadership course+	3
IS 320 History and Chemistry of Beer and Spirits OR	3	Elective	2
IS 322 Ethics, Biology, and Society OR			14
IS 363 Living Ecologically			
Elective	2		
	15		



+Select one of the following courses: PSYC 320 Introduction to Industrial / Organizational Psychology, PSYC 365 Group Dynamics and Individual Behavior, PSYC 474 Organizational Psychology, SOC 338 Industry and Society

++Select one of the following courses: MGMT 451 Managing Organizational Change and Innovation, MGMT 485 Managing Quality and Performance, MGMT 490 Independent study in Management, PROD 490 Independent Study in Operations Management

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

BACHELOR'S DEGREE IN INTEGRATIVE STUDIES: BIOPROCESS SCIENCE

Full Semester	Spring Semester	
Year 1	Year 1	
BIOL 150 Introduction to Biological Sciences I	4	BIOL 151 Introduction to Biological Sciences II
CHEM 121 General Chemistry I	4	CHEM 121b General Chemistry II
CHEM 125a General Chemistry I Lab	1	CHEM 125b General Chemistry II Lab
MATH 125 Pre-Calculus	3	ACS 101 Public Speaking OR
ENG 101 English Composition I	3	ACS 103 Interpersonal Communication
	<u>15</u>	<u>15</u>
Year 2	Year 2	
BIOL 220 Genetics	4	BIOL 250 Bacteriology
CHEM 241a Organic Chemistry I	3	CHEM 241b Organic Chemistry II
RA 101 Reasoning and Argumentation	3	CHEM 245 Organic Chemistry II Lab
Breadth Humanities (BHUM)	3	CHEM 296 Introduction to Chemical Problems OR
Breadth Social Sciences (BSS)	3	BIOL 493 Research in Biology
	<u>16</u>	QR 101 Quantitative Reasoning
		Elective / U.S. Cultures (EUSC)
		<u>3</u>
		15-16
Year 3	Year 3	
CHEM 396 Introduction to Research OR	2	CHEM 396 Introduction to Research OR
BIOL 493 Research in Biology		BIOL 493 Research in Biology
CHEM 480 Fermentation Science I	3	CHEM 482 Fermentation Science II
CHEM 481 Fermentation Science I Lab	1	CHEM 483 Fermentation Science II Lab
Breadth Information & Communication in Society (BICS)	3	Elective / Global Cultures (EGC)
Breadth Fine & Performing Arts (BFPA)	3	300 or 400 level Program Elective or Minor
Elective	3	Elective
	<u>15</u>	<u>3</u>
		13-17
Year 4	Year 4	
INTG 300 Foundations of Integrative Studies	3	INTG 499 Integrative Studies Senior Project
CHEM 351 Basic Biochemistry OR	3	CHEM 496 Chemical Problems OR
CHEM 451a Biochemistry		BIOL 493 Research in Biology
CHEM 484 Fermentation Science III	3	Leadership Course+
CHEM 485 Fermentation Science III Lab	1	Interdisciplinary Studies (IS) course
300 or 400 level Program Elective or Minor	3	Elective (if CHEM 296 OR BIOL 493)
300 or 400 level Program Elective or Minor	3	not taken for credit)
	<u>16</u>	<u>15</u>



+Select one of the following courses: PSYC 320 Introduction to Industrial / Organizational Psychology, PSYC 365 Group Dynamics and Individual Behavior, PSYC 474 Organizational Psychology, or SOC 338 Sociology at Work

BIB PROGRAMS AT SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

BACHELOR'S DEGREE IN INTEGRATIVE STUDIES: INDUSTRIAL BIOPROCESS

Fall Semester		Spring Semester	
Year 1		Year 1	
MATH 150 Calculus I	5	MATH 152 Calculus II	5
RA 101 Reasoning and Argumentation	3	PHYS 151 University Physics 1	4
ENG 101 English Composition I	3	PHYS 151L University Physics Lab	1
ACS 101 Public Speaking OR	3	BIOL 140 Human Biology	3
ACS 103 Interpersonal Communication		ENG 102 English Composition II	3
	<u>14</u>		<u>16</u>
Year 2		Year 2	
MATH 250 Calculus III	4	MATH 305 Differential Equations	3
CE 240 Statics	3	CE 242 Mechanics of Solids	3
CHEM 131 Engineering Chemistry AND	4-5	ECE 210 Circuits	3
CHEM 135 Engineering Chemistry Lab OR		CHEM 120b General Organic and Biological Chemistry II	3
CHEM 120a General Organic and Biological Chemistry I AND		CHEM 124b General Organic and Biological Chemistry II Lab	1
CHEM 124a General Organic and Biological Chemistry I Lab OR		Elective	2
CHEM 121a General Chemistry I AND			<u>15</u>
CHEM 125a General Chemistry I Lab	3		
Breadth Fine & Performing Arts (BFPA)	<u>3</u>		
	15		
Year 3		Year 3	
IE 370 Manufacturing Processes	3	STAT 380 Statistics for Applications (BICS)	3
BIOL 250 Bacteriology	3	IE 345 Engineering Economic Analysis OR	3
CHEM 396 Introduction to Research OR	2	IE 470 Manufacturing Systems OR	4
Elective		IE Plantwide Process Control 476	3
Breadth Humanities (BHUM)	3	CHEM 481 Fermentation Science I AND	3
Interdisciplinary Studies (IS) course	3	CHEM 482 Fermentation Science I Lab OR	16
	<u>14</u>	300 or 400 level Program Elective	
		Breadth Social Science (BSS)	
		Elective / U.S. Cultures (EUSC)	
Year 4		Year 4	
INTG 300 Foundations of Integrative Studies	3	INTG 499 Integrative Studies Senior Project	3
IE 345 Engineering Economic Analysis OR	3	CHEM 484 Fermentation Science III AND	4
IE 470 Manufacturing Systems OR		CHEM 485 Fermentation Science III Lab OR	
IE Plantwide Process Control 476		300 or 400 level Program Elective or Minor	
CHEM 482 Fermentation Science II AND	3	Leadership Course+	3
CHEM 483 Fermentation Science II Lab OR	3	Elective / Global Cultures (EGC)	3
300 or 400 level Program Elective	3	Elective	3
300 or 400 level Program Elective or Minor	<u>3</u>		<u>15</u>
300 or 400 level Program Elective or Minor	15		



+Select one of the following courses: PSYC 320 Introduction to Industrial / Organizational Psychology, PSYC 365 Group Dynamics and Individual Behavior, PSYC 474 Organizational Psychology, SOC 338 Industry and Society

“GROW YOUR FUTURE” PILOT PROJECT

With Building Illinois’ Bioeconomy Consortium resources, the pilot project “Grow Your Future” has been launched to educate regional students and families about the opportunities that exist in bio-based industries, advanced manufacturing, agriculture, and related sectors, then to connect them to the necessary education and training.

As part of “Grow Your Future,” the Building Illinois Bioeconomy Consortium and the SIUE East St. Louis Center have partnered towards an intensive multigenerational approach to breaking the cycle of poverty while also promoting regional growth.



Awareness for high skills industry careers that pay family-sustaining wages is raised through targeted activities at multiple levels, from K-12 classroom modules and field trips for Upward Bound and Trio students to employer visits and informational sessions for Head Start parents and families.



Preparedness for these careers is fostered by connecting East St. Louis students and families to educational programs at SIUE and several community college partners to help deliver a skilled workforce to regional employers and improve the quality of life for residents.

The “Grow Your Future” initiative is making inroads into both identifying people to prepare for these higher skill, higher pay jobs, and offering them the needed educational opportunities and career pathways, as recognized in 2017 with a What’s Right With the Region award by Focus St. Louis.

“Grow Your Future” contributes to developing a talent pipeline meeting regional employment needs, while also lifting families out of poverty.

Recent graduates of programs that are a part of this initiative have been hired by major employers including Phillips 66, Green Plains Inc., Illinois and Missouri American Water, and more.



SUCCESS STORIES



Chris Wense
Operations Technician, NCERC
Edwardsville, IL

“While I now find success in the bioenergy industry, my future wasn’t always so clear. In April 2015, I was one of nearly 2,000 workers permanently laid off from U.S. Steel. I was a 41 year old husband and father of two boys, and I was starting over.

Due to support from the Trade Adjustment Assistance Act and the Workforce Innovation Opportunity Act, through Madison County Employment and Training, I was able to pursue a degree in Process Operations Technology at Lewis and Clark Community College. Going back to the classroom was intimidating, but after doing my research and learning about this program and the job opportunities it prepares you for, I decided to dive in and give it my best.

During my last semester in the PTEC program at Lewis and Clark Community College, I started an internship at NCERC at SIUE. Here, I was able to put my classroom knowledge to practice in an applied, hands-on environment that replicates industrial conditions. Today, I am pursuing my Bachelor’s Degree in Industrial Technology from Southern Illinois University Carbondale while working full-time as an Operating Technician at NCERC at SIUE.”

SUCCESS STORIES



Erin Ruppert
Wastewater Collection Foreman
Wentzville, MO

“I was a single mother of two working in a dead end job. At the time, I wasn’t sure what I wanted out of a career, but I did know that I wanted a fulfilling career.

I enrolled in the Environmental Resources Training Center at Southern Illinois University Edwardsville for the Water Quality Control Operations program and it changed my life. I found not only a career, but a passion for the water and wastewater industry.

Today, I am employed as a Wastewater Collections Foreman and couldn’t be happier. I can’t thank enough the instructors and staff at ERTC and in the Water Quality Control Operations program. They provided me with the knowledge and skills needed for my success.”

CONTACT US

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