

**APPROVED**  
**AUGUST 6, 2013**

Item #III-9  
August 6, 2013

**NEW UNITS OF INSTRUCTION, PUBLIC SERVICE,  
AND RESEARCH AT PUBLIC UNIVERSITIES**

**Submitted for:** Action.

**Summary:** This item requests approval of two degree programs and one center at three public universities.

**Action Requested:** That the Illinois Board of Higher Education approve the following:

Northern Illinois University

- Master of Science in Financial Risk Management in the West Suburban Region

University of Illinois at Urbana-Champaign

- Grainger Center for Electric Machinery and Electromechanics in the Prairie Region

Western Illinois University

- Doctor of Philosophy in Environmental Science: Large River Ecosystems in the Western Region



STATE OF ILLINOIS  
BOARD OF HIGHER EDUCATION

**NEW UNITS OF INSTRUCTION, PUBLIC SERVICE,  
AND RESEARCH AT PUBLIC UNIVERSITIES**

By statute, the Illinois Board of Higher Education is responsible for approving new on-campus and off-campus units of instruction, organized research, and public service, and units of administration proposed by public university governing boards. The Board's approval criteria, defined in rules adopted for administering the statute, address university mission, academic control, faculty and staff, support services, financial resources, student demand, curriculum, statewide need, and congruence with Board policies and priorities. In addition to the approval criteria in rules, each new program was reviewed for its contributions to the goals of the *Illinois Public Agenda for College and Career Success*, which sets forth new priorities to guide Illinois higher education. Staff recommendations are based on analyses of application materials and responses to staff questions, and, for advanced degree programs, recommendations of external consultants.

**Northern Illinois University**

**Proposed Program Title in Region of Authorization:** Master of Science in Financial Risk Management in the West Suburban Region

*Projected Enrollments and Degrees:* Northern Illinois University has projected that enrollment in the proposed Master of Science in Financial Risk Management will consist of 30 students per year during the first five years. It is expected approximately 30 degrees will be awarded in the program every year in the first five years. If enrollments surpass the projections after the first five years, a corresponding number of degrees will be awarded.

**Background**

Northern Illinois University (the University or NIU) requests authority to offer the Master of Science in Financial Risk Management (FRM) in the West Suburban Region. The proposed program is to be housed in the Department of Finance within the College of Business. The objectives of the program are to provide students with the knowledge and analytical skills required for employment in financial risk management occupations and to acquire the necessary professional designation as financial managers.

Over the last several years, the world has witnessed a seismic shift in the finance industry because years of ever-increasing asset prices and greater risk-taking, supported by the engineering of ever more complex financial derivatives, have given way to plunging asset values and unprecedented timidity and trepidation about financial investments. The lessons learned from the financial crisis have made business entities of all types increase their emphasis on analysis of the financial risks they take when considering and making investments. Pressures to embrace risk management at the firm level, and even at the individual level, arise from multiple

sources. For example, financial price volatility has increased over time, leading many to believe that we have experienced a permanent upward shift in the risk associated with this volatility. At the same time, many boards of directors have become more aware of their responsibilities for managing their financial risks. Moreover, rating agencies are beginning to directly examine firms' risk management activities as part of the bond rating process. As a result of these and other pressures, greater emphasis is being placed on better financial risk management, including seeking and hiring professionals trained as financial risk managers to reduce system-wide financial catastrophes.

In light of these conditions, NIU seeks to establish this program to train better qualified financial risk managers. No similar degree program is currently offered in Illinois. The utility of such a program is further heightened given the fact that Chicago is one of the world's leading financial centers.

The proposed degree program will build on nearly ten related existing NIU degree programs. They include baccalaureate programs in finance, computer science, and mathematics, as well as master's programs in information systems, computer science, mathematics, and applied probability and statistics, and a Ph.D. in mathematical sciences.

## **Need**

*1050.30(a)(6): A) The unit of instruction, research or public service is educationally and economically justified based on the educational priorities and needs of the citizens of Illinois; B) The unit of instruction, research or public service meets a need that is not currently met by existing institutions and units of instruction, research or public service.*

In the spring semester of 2011, a survey of 475 NIU junior and senior students majoring in finance, as well as alumni of the program, was conducted to determine the level of interest in the M.S. in FRM. In summary, 55 to 65 respondents indicated they would be somewhat interested or very interested in the proposed one-year program to be offered in Naperville in the University's home Higher Education Region for about \$18,630. The response convinced the University there would be sufficient student demand for the program.

The State of Illinois is home to thousands of private and public institutions, including corporations, charities, colleges and universities, and privately owned businesses. All of these institutions will increasingly need to manage their financial risks and to show, in a systematic manner, how they manage financial risks. More specifically, the Chicago area is the home of multiple exchanges on which financial instruments are traded. These instruments form the backbone of the financial risk management strategies employed by financial and nonfinancial corporations alike.

Due to regulatory pressure and/or pressure for the increasingly savvy investor, many of the non-financial corporations in Illinois will need to either develop financial risk management capabilities internally or outsource these functions to better equipped financial institutions. As a result, according to Standard and Poor's 2010 and Anderson and Frigo 2012, financial corporations such as commercial and investment banks will need to increasingly provide financial risk management services for their clients and to increase their own financial risk management capabilities with the contributions of graduates of the proposed program and similar programs.

Impetus for considering development of this program grew out discussions of prospective faculty of the program with the Department of Finance Board of Executives Advisors which is

comprised of financial professionals in commercial banking, insurance, financial consulting, corporate treasury, mortgage banking, and risk management. The advisors unanimously agreed to the importance and need to offer this program. The financial risk management ad hoc Board of Executive Advisors from seven relevant firms were consulted, and they also supported the development of this program.

Financial risk management is a relatively new field or occupation. As such, it is not yet a unit of analysis of the Illinois Department of Employment Security (IDES), the state agency responsible for studying and projecting occupational supply and demand in the state. However, IDES' projections for the period 2010 to 2020 indicate there will be a 14.2 percent employment growth for financial specialists and also a 20.9 percent growth for financial analysts compared to 8.6 percent growth for all occupations in Illinois. The state's employment projections indicate there will be employment of 504 financial analysts, 554 financial managers, and 292 financial specialists annually.

According to the U.S. Bureau of Labor Statistics, "Demand for financial risk managers remains strong. While individuals' career prospects will always vary according to the nature of their prior professional experience, the FRM designation is valued by employers in all regions of the world. Certified FRMs are employed by most every major banking institution, government regulator, consulting firm, and financial services institution around the world." Consistent with this positive employment outlook, *Occupational Outlook Handbook* has indicated that, "Overall employment of financial analysts is expected to increase by 23 percent during the 2010-2020 decade which is much faster than the average for all occupations." Those with master's degrees and certification in financial management will experience the best job prospects.

### ***The Illinois Public Agenda for College and Career Success***

The M.S. in FRM program will address Goal 3 of *The Illinois Public Agenda for College and Career Success*.

Goal 3 of *The Illinois Public Agenda*, to increase the number of high-quality post-secondary credentials to meet the demands of the economy and an increasingly global society, will be addressed by educating and graduating students in the proposed program and contributing to increasing the number of high quality degrees, and to Illinois Board of Higher Education (IBHE), state, and national priorities. Success of graduates of the program will contribute to reducing risks in the financial and investment industries in the future, thus contributing to the growth and stability of the economy.

In addition, to an extent, the master's in FRM program will address Goal 4, involving the integration of *Illinois' educational, research and innovation assets to meet economic needs of the state and its regions* by preparing its students to engage in important research in topics related to financial risk management.

This program will also address Goal 2 of *The Illinois Public Agenda*, *Ensure college affordability for students, families, and taxpayers* because cost of completion is considerably less than similar programs offered at area universities. At approximately \$19,240 total cost, the NIU program would be approximately \$31,250 less costly than a similar DePaul University's program, \$29,864 less expensive than a similar program at Illinois Institute of Technology, and \$30,00 less than a program at Loyola.

## Comparable Programs in Illinois

No Illinois public university currently offers a degree program specifically in financial risk management. However, three institutions in the state offer degree programs that are related to this program. DePaul University offers an M.B.A. with a concentration in behavioral finances; the Illinois Institute of Technology offers an M.S. in Financial Markets and an M.B.A. in Financial Management; and St. Xavier University offers both an M.S. and an M.B.A. in Financial Fraud Management. Additionally, Loyola University offers a Concentration in Risk Management within its M.S. in Finance program.

## Mission and Objectives

*1050.30(a)(1): A) The objectives of the unit of instruction, research or public service are consistent with the mission of the college or university; B) The objectives of the unit of instruction, research or public service are consistent with what the unit title implies.*

The goal of the Master of Science in FRM is for graduates to be competent in utilizing financial risk management methodologies and skills – which requires understanding of complex financial instruments – for the identification, management, and/or mitigation of the financial risks faced by various for-profit and not-for-profit enterprises. To meet this overarching goal, students must achieve the following learning objectives, each of which is supported by one or more key courses:

- Master the statistical and econometric techniques used to evaluate and measure financial risks and to price derivative securities;
- Acquire an in-depth understanding of financial markets and the markets in which derivative securities are traded;
- Demonstrate an understanding of the regulations related to financial management and the risk related to noncompliance with those regulations; and
- Demonstrate knowledge of sophisticated models of risk and scenario analysis, and apply this knowledge successfully in various situations and a variety of asset classes.

The objectives of this program are consistent with and support the mission of the University and the goals of *The Illinois Public Agenda*. The title of the program depicts correctly the content of the program.

## Curriculum and Assessment

*1050.30(b)(1): A) The caliber and content of the curriculum must assure that the objectives of the unit of instruction will be achieved. B) The breadth and depth of the curriculum must be consistent with what the title of the unit of instruction implies. C) The admission and graduation requirements for the unit of instruction must be consistent with the stated objectives of the unit of instruction. D) Institutions must show the capacity to develop, deliver and support academic programs. Procedures and policies that will assure the effective design, conduct and evaluation of the degree program under the academic control of the institution must be developed. Assessment plans must demonstrate that the institution has identified clear and appropriate program and student learning goals and has defined appropriate outcomes. Appropriate data must be collected and may be requested by the Board to show the level of student learning that has occurred as a result of participation in the institution's programs of study. E) Degree programs must meet [appropriate] requirements.*

## Admission Requirements

To be admitted to this program, an applicant must meet the general admission requirements of the College of Business which constitute completion of foundational courses comprising 18 semester hours. Courses that support this phase include Financial Accounting Concepts, Fundamentals of Financial Management, Principles of Management, Legal Aspects of Business, Business Information Systems, and Business Statistics. The second phase of admission requirements stipulates that the student should have undergraduate semester hours in finance or a functional equivalent. The third phase requires that each student complete two 500-level courses in finance: Seminar in Financial Research and Financial Data Analysis. These courses are prerequisites for the program and will take the student from the level of statistical understanding acquired at the undergraduate to the level needed for financial risk management.

## Curriculum

The curriculum of the Master of Science in FRM consists of ten courses comprising 30 semester hours of courses at the graduate level. All students who have not demonstrated completion of equivalent course(s) must complete these courses. The core courses include the following at the 500 and 600 levels:

- Analysis of Derivative Securities
- Financial Markets and Investments
- Financial Data Analysis
- Seminar in Financial Research
- Security Analysis
- Investment Management
- Analysis of Fixed Income Securities
- Financial Management Strategies
- Risk Management I and II

Although it is not apparent in the title, ethics is addressed specifically in the Risk Management I course. More importantly, ethics education is a part of practically every course in the College of Business at NIU. This is validated by NIU's College of Business making *Businessweek* rankings as a top business college in the U.S. in terms of ethics in education for four consecutive years.

## Assessment of Student Learning Outcomes

Assessment of student learning will be accomplished using a number of evaluation tools including tests, quizzes, and exams in each course. In addition to students meeting the four learning objectives, faculty will use five specific measures of success; students will be able to:

- Calculate the Value at Risk (VaR) in various financial scenarios;
- Compare derivative markets and the use of pricing of various derivatives;
- Assess various risk mitigation techniques and be able to analyze situations and make recommendations regarding risk mitigation;
- Estimate econometric models and make predictions based on those models; and
- Explain regulatory requirements for risk management in various situations.

In addition, formal and informal assessment of the program will be made by the Department of Finance Board of Executives Advisors as well as the FRM ad hoc Board of Executive Advisors, professional financial bodies that were consulted during program development.

#### Program Assessment

Consistent with the IBHE staff requirements, the University will submit to the IBHE a progress report on the Master of Science in FRM program at the end of the third year of operation. The report will summarize key areas of accomplishments by the faculty and any remaining challenges and how each challenge will be addressed. In addition, the program faculty will participate in the University's eight-year program review process to assess the program using multiple measures including evaluation of faculty teaching in the program by students; the level of faculty research, scholarship and public service, awards and honors; retention and graduation rate of students in the program; and the level of alumni and employer satisfaction with the program. The faculty will use measures such as the percent of graduates employed in occupations closely related to the discipline. The program faculty will use scores of students who will take the FRM examination for certification as additional assessment of the quality of this program. Although there is no specialized accreditation for financial risk management programs, as a part of the College of Business, this program will be included in the accrediting procedures and review the College undergoes for the International Association to Advance Collegiate Schools of Business (AACSB). A summary of the program review, including the program's strengths and weaknesses, as well as steps to be taken to improve the program, will be submitted by the University to the IBHE with summaries of other programs reviewed in the same cycle.

#### **Facilities (space, equipment, instructional materials)**

*1050.30(a)(4): A) Facilities, equipment and instructional resources (e.g., laboratory supplies and equipment, instructional materials, computational equipment) necessary to support the high quality academic work in the unit of instruction, research or public service are available and maintained; B) Clinical sites necessary to meet the objectives of the unit of instruction, research or public service; C) Library holdings and acquisitions, owned or contracted for by the institution, that are necessary to support high quality instruction and scholarship in the unit of instruction, research and public service, are conveniently available and accessible, and can be maintained.*

#### Technology and Instructional Resources

The proposed master's in FRM program will be housed in the Department of Finance within the College of Business. Given the importance of this program to the University and the College of Business, general resources of the Department and the College will be available to support this program. The current existing funds that will support the program are estimated at \$190,000 each year of the first four years. General resources such as classrooms, offices, computer labs, and instructional technology are sufficient to support this program.

#### Library

The main University library has significant library resources that support the College of Business' six bachelor's and four master's degree programs. There are also sufficient library resources that will support this program such as library resources for degree programs in

mathematics and computer science. The University is a member of the consortium of Illinois academic research libraries whose resources can augment the collection of a member institution.

Specifically, to support the proposed program the following textbooks will be used: *Options, Futures and Other Derivatives*, *Financial Risk Manager Handbook*; *Modern Portfolio Theory and Investment Analysis*; *Mathematics and Statistics for Financial Risk Management*; *Introduction to Econometrics*; *Commodities and Commodity Derivatives: Modeling and Pricing for Agriculturals, Metals, and Energy*; *Measuring Market Risk*; and *Managing Credit Risk*.

The M.S. in FRM program will be served by at least 11 key text and electronic journals, including: *Review of Futures Markets*, *Journal of Futures Markets*, *Journal of Derivatives*, *International Review of Economics and Finance*, *Journal of Applied Finance*, *Journal of Derivatives and Hedge Funds*, *Journal of Multinational Finance*, *Journal of Financial Risk Management*, and *International Journal of Financial Engineering and Risk Management*. In addition, the program will be supported by a number of key databases for financial risk management, including: Center for Research in Security Prices database, Compustat, DataStream, and Tick Data.

### **Faculty and Staff**

*1050.30(a)(3): A) The academic preparation and experience of faculty and staff ensure that the objectives of the unit of instruction, research or public service are met.*

Five well-qualified faculty members will be responsible for the M.S. in FRM; four have earned Ph.D.s in Finance and one has an earned Ph.D. in Economics. Together, their doctoral training encompasses many specialties, including Finance, Derivatives, Risk Analysis, and Econometrics. In addition to these qualifications, three of the faculty members hold Chartered Financial Analyst credentials in Financial Risk Management and Quantitative Analysis. Three of the faculty members have published extensively in peer reviewed journals and one of them worked as a trader, trading options and other instruments.

### **Fiscal and Personnel Resources**

*1050.30(a)(5): A) The financial commitments to support the unit of instruction, research or public service are sufficient to ensure that the faculty and staff and support services necessary to offer the unit of instruction, research or public service can be acquired and maintained; B) Projections of revenues necessary to support the unit of instruction, research or public service are based on supportable estimates of state appropriations, local tax support, student tuition and fees, private gifts, and/or governmental grants and contracts.*

No new state resources are needed to establish the proposed Master of Science in FRM because the University will have sufficient resources, including student tuition. It is projected the budget of the program will be approximately \$383,076 during each of the first four years. The budget includes \$190,476 of current funds in the Department. While most of the budget will support personal services and other personnel costs, over \$92,000 will pay for supplies, services, and equipment and about \$35,000 for facilities per year.

## Accreditation and Licensure

*1050.30(b)(3): Appropriate steps shall be taken to assure that professional accreditation needed for licensure or entry into a profession as specified in the objectives of the unit of instruction is maintained or will be granted in a reasonable period of time.*

*1050.50(a)(1): Three years after approval of a new program, the institution shall provide a program progress report to the Board as part of the institution's annual report. The third year progress report shall describe the institution's performance in meeting program objectives and show where any improvements are necessary. The placement of a program in voluntary temporary suspension will not negate the requirement of submitting a third year progress report.*

*1050.50(a)(2)(C): Requirement for Programs in which State Licensure is Required for Employment in the Field: In the case of a program in which State licensure is required for employment in the field, a program can be found to be in good standing if the institution is able to provide evidence that program graduates are eligible to take the appropriate licensure examination and pass rates are maintained as specified in the objectives of the unit of instruction. If there is no such evidence, the institution shall report the program as flagged for review.*

There is currently no specialized accreditation for degree programs in financial risk management. However, as a part of the College of Business, this program will be included in the accrediting procedures and review when the College undergoes the evaluation of the International AACSB. Furthermore, the University's accreditation by the Higher Learning Commission covers all degree programs offered by NIU.

The FRM certificate is managed by Global Association for Risk Professionals. Its benefits notwithstanding, it is neither required for graduates of NIU's proposed program to complete nor is it required by the state of Illinois. If approved, this program may encourage and assist its students to seek the certificate based on the individual student's cost-benefit analysis.

## Program Information

*1050.30(b)(2)(A): The information the institution provides for students and the public...(B) The information listed in subsection (b)(2)(A) shall be available to prospective students prior to enrollment and shall be included in the institution's catalog of programs.*

Information about NIU's Master of Science in FRM, including a detailed description of the curriculum, admission requirements, tuition, fees, and other cost information, as well as University and graduate school policies, will be published on the University's website, [www.niu.edu](http://www.niu.edu). Comparable information about the program will be published in hard copy in the University's Graduate catalog and similar information may be available from the College of Business upon request.

**Staff Conclusion.** The staff concludes that the Master of Science in Financial Risk Management program proposed by Northern Illinois University meets the criteria to implement the Board of Higher Education Act (110 ILCS 205/et.seq.) as set forth in 23 Illinois Administrative Code, Ch. II, Section 1050.30, and the Illinois Board of Higher Education policies pertaining to assessment and accreditation for licensure.

## **University of Illinois at Urbana-Champaign**

**Proposed Center Title in Region of Authorization:** Grainger Center for Electric Machinery and Electromechanics in the Prairie Region

*Projected Enrollments and Degrees:* This proposal is for a new organized research and public service center, the Grainger Center for Electric Machinery and Electromechanics. As such, projections of student enrollments and degrees awarded are not relevant to this proposal. Although the Center does not offer degree programs, it has played and will continue to play an important role in promoting and contributing to the research, teaching, and public service mission of academic units related to the Center's mission and objectives, particularly supporting students in the Department of Electrical and Computer Engineering. Among its other functions, the Center nurtures large student team projects, including the Solar Decathlon, the Future Energy Challenge, and the Formula Hybrid Team.

### **Background**

The University of Illinois at Urbana-Champaign (the University) requests authority to establish the Grainger Center for Electric Machinery and Electromechanics (CEME) in the Prairie Region. The primary contributions of the Center are in the field of energy, including long-term fundamental advances in electric machinery, transportation and vehicles, energy resources, and energy efficiency and reliability. The Center is an autonomous entity within the Power and Energy Systems area in the Department of Electrical and Computer Engineering. It is led by a Director who reports to the Department Head, who reports to the Dean of the College of Engineering. The Director is an endowed professor assisted by an Associate Director, a staff engineer, and other staff.

CEME is an academic hub surrounded by collaborating universities with large research groups, including Purdue University, University of Wisconsin-Madison, Georgia Institute of Technology, and Ohio State University. Also, to a lesser extent, the Center works with other universities such as Oregon State University, Texas A & M University, Virginia Tech, University of Texas-Austin, and the University of California at Berkeley. It funds proposals from these universities to push research in directions that will be taken up by industry in the future, and it actively collaborates with these universities to secure research grants from the National Science Foundation, the military, and industry.

CEME's instructional activities include classroom lectures, laboratory classes, and laboratory research which are carried out by undergraduate, graduate, and postdoctoral students, as well as visiting scholars. Additional instructional development occurs through student and faculty publications and presentations at conferences and university seminars.

The proposed Center will build upon the successes of the Department of Electrical and Computer Engineering's B.S. in Electrical Engineering, M.S. and Ph.D. in Electrical and Computer Engineering, and to some extent the nearly 40 degree programs offered by the College of Engineering and other degree programs in other colleges at the University.

### **Need**

*1050.30(a)(6): A) The unit of instruction, research or public service is educationally and economically justified based on the educational priorities and needs of the citizens of Illinois; B)*

*The unit of instruction, research or public service meets a need that is not currently met by existing institutions and units of instruction, research or public service.*

The proposed Center is needed in Illinois because it is an academic hub for the University and about ten other collaborating universities identified above. Its current budget of about half a million dollars is expected to grow when it is a fully established Center with more national visibility. Electric machines, one of its foci, consume nearly two-thirds of all global electricity and are essential in growth industries such as transportation, small portable devices, and wind and wave power generation. Key elements of the relevant industry are centered in Illinois, and the Center is strategically located as the regional hub for research in electric machinery. A high level of high-tech motor work is done at industry locations in the Chicago and Rockford areas. Major industries applying research from the Center include Motorola, Caterpillar, John Deere, Electro-Motive Diesel, and MPC Products. Student researchers and graduates affiliated with the Center have taken their expertise throughout the Midwest to St. Louis (Bitrode and Emerson Electric); numerous cities in Indiana including Indianapolis (Rolls-Royce), West Lafayette (P.C. Krause Consulting) and Kokomo (Delphi); Milwaukee (Eaton and Rockwell Automation); and Detroit (Ford and General Motors).

Some research of the Center is funded by the U.S. Army Corps of Engineers Construction Engineering Research Laboratory in Champaign which employs graduates who were served by the Center when they were students. Negotiations for collaboration are ongoing with other branches of the U.S. military, including the Naval Sea Systems Command whose main facility is located in Crane, Indiana. In addition, discussions are also in progress with Rolls-Royce military applications and the Power Systems group at Boeing. For the longer term, the Center is engaged in discussions related to the Illinois high-speed rail system and the auto industry, including Mitsubishi in Bloomington.

According to the Illinois Department of Employment Security, employment in engineering occupations is expected to grow by 8.8 percent between 2010 and 2020 compared to 8.6 percent the average for all Illinois occupations. While employment in some occupations will decline or not grow, employment in occupations such as computer hardware engineers is projected to grow by 29 percent during this period. Some of the computer hardware engineering occupations include occupations that serve electric machinery targeted by the Center.

Linking research and innovation to economic growth is addressed by the Center by actively preparing patents, participation in technology transfer, and contribution to delivering innovation for economic growth. To illustrate the Center's contributions to economic development, SolarBridge Technologies, Inc., the leading provider of grid-connected solar energy, is a start-up company developing the Center's technology. The firm now employs about 75 workers, all working on CEME-based technology. Two additional promising projects were recently announced by the College of Engineering Strategic Research Initiatives program. Since 2010, the Center has supported Power and Energy Conferences in the state. In 2012 the Center supported the North American Power Symposium held in Champaign and attended by about 200 students. CEME has supported the Institute for Electrical and Electronic Engineers (IEEE) 2013 International Electric Machines and Drives Conference headed by the Center's Director.

### ***The Illinois Public Agenda for College and Career Success***

The Grainger Center for Electric Machinery and Electromechanics addresses Goal 4 of *The Illinois Public Agenda*, "Better integrate Illinois' educational, research, and innovation assets to meet economic needs of the state and its regions." This goal is addressed through the Center's

mission and goals to promote and conduct research focusing on electric machinery and electromechanics that lead to inventions and innovations transferrable to economic development with the support of universities and industry. Already the Center's research outcomes have led to the creation of some high-tech businesses.

The Center also addresses Goal 3, "Increase the number of high-quality post-secondary credentials to meet the demands of the economy and an increasingly global society." It is accomplished by the Center engaging in laboratory related instruction and research for undergraduate and graduate students. The Center supports 15 master's degree students and 27 Ph.D. students who are employed by other institutions of higher education and high tech enterprises, including John Deere, Caterpillar, Ameren, Rolls Royce, Bose Corporation, Intel, GE, and Texas Instruments.

To some extent, the Center also addresses Goal 2, to improve college affordability by (a) supporting classroom and laboratory innovations through making educational and lab materials publicly available through CEME's website and annual reports, and IDEALS (Illinois Digital Environment for Access to Learning and Scholarship), and (b) providing several \$10,000 annual renewable undergraduate leadership scholarships, as well as paying hourly stipends to dozens of students working in its laboratories.

### **Comparable Institute and Centers in Illinois**

Currently, no other center or institute with a mission focusing on electric machinery and electromechanics operates in Illinois. However, numerous Illinois higher education institutions offer degree programs in electrical engineering and electrical and computer engineering. Some of the institutions may have academic units and centers or institutes with similar functions.

### **Mission and Objectives**

*1050.30(a)(1): A) The objectives of the unit of instruction, research or public service are consistent with the mission of the college or university; B) The objectives of the unit of instruction, research or public service are consistent with what the unit title implies.*

The proposed Center is designed to focus on the energy field, including long-term fundamental advances in electric machinery, transportation and vehicles, energy resources, and energy efficiency and reliability. To address this mission Center objectives are to:

- Offer in collaboration with other academic units at the University, lecture and laboratory instruction to undergraduates and graduate students without offering degree programs;
- Promote and facilitate research and research opportunity for undergraduate and graduate students, as well as postdoctoral students;
- Provide several \$10,000 annual renewable undergraduate leadership scholarships;
- Fund research projects to scholars from collaborating academic units at the University and other universities; and
- Seek and obtain research funds from federal agencies, foundations and private firms to fund important projects.

The mission and objectives of the Center are consistent with the mission of the University and they address University priorities and some of the goals of *The Illinois Public Agenda for*

*Student and Career Success.* The title of the Center accurately reflects the mission and goals of the Center.

### **Accomplishments of the Center**

The Center, in collaboration with the Department, the College, and other academic units at the University, has significant and growing investments in the electrical energy and motion control fields through: instruction of undergraduate and graduate students, support of undergraduate and graduate student research, support of conferences since 2010, renewable undergraduate student scholarships, faculty publications and conference presentations, and research funding of faculty, including faculty from other collaborating universities. It is expected that when the Center is fully established it will accomplish much more through significant external grants and contracts from federal agencies, foundations, and industries interested in the applications of the Center's research outcomes.

Numerous student activities receive Center support through the CEME Collaborative Network. These include two to three external research proposals at \$20,000 annually, the Solar Decathlon (typically held in Washington D.C., but will be held in China in 2012-13), the annual Formula Hybrid team competition in New Hampshire, and the Power and Energy Conference, which is organized and led by graduate students and has been held since 2009.

Businesses served by the Center include two related start-up companies, PowerWorld and SolarBridge, as well as 11 other Power Affiliates, including Ameren; Bitrode Corporation; City Water, Light & Power (Springfield, IL); Electrical Manufacturing & Coil Winding Association, Inc.; Exelon, Flanders Electric; G&W Electric; and MidAmerican Energy Company. In addition, there are on-going relationships with John Deere, National Instruments, Texas Instruments, Delphi, and Google.

### **Assessment of the Center Outcomes**

In collaboration with the Department of Electrical and Computer Engineering, the Center will create and implement an assessment of its outcomes in addition to processes already in place. Since the Director of the Center reports to the Department Head who reports to the Dean of the College, the Dean will participate in the assessment. The assessment will be assisted by the Center's Advisory Board composed of leading academics from the Center's collaborating universities, including Georgia Tech, University of Wisconsin-Madison, Purdue University, Ohio State University and the University of California at Berkeley. The Board meets at least once a year.

Consistent with the Illinois Board of Higher Education policies, the University will submit at the end of the third year of operation a short progress report documenting the Center's successes and any challenges that remain to be addressed. The Center will participate in the University's eight-year program review process, and it will submit via the Office of the Vice President for Academic Affairs a summary of the program review results including strengths of the Center and any problems that should be addressed in the near future.

### **Facilities (space, equipment, instructional materials)**

*1050.30(a)(4): A) Facilities, equipment and instructional resources (e.g., laboratory supplies and equipment, instructional materials, computational equipment) necessary to support high quality academic work in the unit of instruction, research or public service are available and*

*maintained; B) Clinical sites necessary to meet the objectives of the unit of instruction, research or public service; C) Library holdings and acquisitions, owned or contracted for by the institution, that are necessary to support high quality instruction and scholarship in the unit of instruction, research and public service, are conveniently available and accessible, and can be maintained.*

The Center is located in the Grainger Laboratory which includes the Undergraduate Grainger Center for Electric Machinery and Electromechanics Research and Leadership Program. The Laboratory was funded by the Grainger Foundation which has an endowment since 2003 after three years of initial funding of the Center. The endowment was substantially increased in 2007. As a result, the Center does not receive state funds. The Center has 230,000 gross square feet space and it has a “beyond” Leadership in Energy and Environmental Design Platinum design projected to become the largest zero net energy building in the U.S. The new Laboratory, in conjunction with resources of the Department and the College of Engineering, is sufficient to support the Center.

The Center annually supports approximately 15 graduate students and 30 undergraduates doing research in the Laboratory. More than 300 different students were enrolled in five Center courses in 2011-12. Graduate students from various academic units and departments at the University, including Power and Energy, Electromagnetics, Microelectronics, Mechanical Science and Engineering, and Chemical and Biomolecular Engineering, are supported by the Center.

### **Faculty and Staff**

*1050.30(a)(3): A) The academic preparation and experience of faculty and staff ensure that the objectives of the unit of instruction, research or public service are met.*

Many faculty members at the University and at the collaborating universities are involved in Center activities, including research and instruction. As a group, faculty members are working with 15 master’s students who are employed in Illinois industry and 27 Ph.D. students employed in academia and industry. More than 600 technical articles have been published by Center-related faculty members and students, including 37 listed publications in peer reviewed journals, most of them in the IEEE publications. Currently four faculty members are actively involved in grant-funded research activities. Three of them were awarded many grants and contracts, and one of them had two awards in excess of one million dollars. The faculty members are very active in research, publication, and other academic endeavors. As in the past, different faculty members will be affiliated with the Center and work on mutually beneficial Center activities.

### **Fiscal and Personnel Resources**

*1050.30(a)(5): A) The financial commitments to support the unit of instruction, research or public service are sufficient to ensure that the faculty and staff and support services necessary to offer the unit of instruction, research or public service can be acquired and maintained; B) Projections of revenues necessary to support the unit of instruction, research or public service are based upon supportable estimates of state appropriations, local tax support, student tuition and fees, private gifts, and/or governmental grants and contracts.*

No new state resources are needed to establish the Grainger Center for Electric Machinery and Electromechanics because an endowment from the Grainger Foundation and grants and contracts from external sources provide funding. The Foundation has supported the

Center since its inception. It is expected that as the Center becomes well-established in the future, it will be better positioned to get more external funds from federal agencies, foundations, and collaborating private firms.

It is projected that the Center's budget will be approximately \$520,000 per year during the first four years. About \$457,116 of the funds will pay for other personnel costs and the rest will pay for supplies, services, and equipment. The actual expenditures in 2011-12, including equipment, totaled \$487,797, about seven percent below the target. Additionally, Center activities are leveraged with project support from several other sources, notably the Global Clean Energy Program at Stanford University, the Department of Energy, and two industry sponsors.

### **Accreditation and Licensure**

*1050.30(b)(3): Appropriate steps shall be taken to assure that professional accreditation needed for licensure or entry into a profession as specified in the objectives of the unit of instruction is maintained or will be granted in a reasonable period of time.*

*1050.50(a)(1): Three years after approval of a new program, the institution shall provide a program progress report to the Board as part of the institution's annual report. The third year progress report shall describe the institution's performance in meeting program objectives and show where any improvements are necessary. The placement of a program in voluntary temporary suspension will not negate the requirement of submitting a third year progress report.*

*1050.50(a)(2)(C): Requirement for Programs in which State Licensure is Required for Employment in the Field: In the case of a program in which State licensure is required for employment in the field, a program can be found to be in good standing if the institution is able to provide evidence that program graduates are eligible to take the appropriate licensure examination and pass rates are maintained as specified in the objectives of the unit of instruction. If there is no such evidence, the institution shall report the program as flagged for review.*

There is no specialized accreditation for centers/institutes in fields related to energy. However, the Department of Electrical and Computer Engineering and the College of Engineering are accredited by Accreditation Board for Engineering and Technology. The University's accreditation by the Higher Learning Commission covers all its degree programs.

### **Program Information**

*1050.30(b)(2)(A): The information the institution provides for students and the public...(B) The information listed in subsection (b)(2)(A) shall be available to prospective students prior to enrollment and shall be included in the institution's catalog of programs.*

Information about the Grainger Center for Electric Machinery and Electromechanics, including a summary description of the mission and objectives, structure and leadership, and assessment activities, will be published on the University's website, [www.illinois.edu](http://www.illinois.edu). Comparable information about the Center will be published in the University's catalogs and similar information about the Center may be available from the Department of Electrical and Computer Engineering and the College of Engineering upon request.

**Staff Conclusion.** The staff concludes that the Grainger Center for Electric Machinery and Electromechanics proposed by the University of Illinois at Urbana-Champaign meets the criteria to implement the Board of Higher Education Act (110 ILCS 205/et.seq.) as set forth in the Board

of Higher Education administrative rules (23 Ill. Adm. Code 1050.30), and the Illinois Board of Higher Education policies pertaining to assessment and accreditation for licensure.

## **Western Illinois University**

**Proposed Program Title in Region of Authorization:** Doctor of Philosophy in Environmental Science: Large River Ecosystems in the Western Region

*Projected Enrollments and Degrees:* Western Illinois University has projected that enrollment in the proposed Ph.D. in Environmental Science: Large River Ecosystems will be eight students in the first year, growing to approximately 12 students in the fifth year. It has projected that two to three degrees will be awarded in the fifth year.

## **Background**

Western Illinois University (WIU or the University) requests authority to offer the Doctor of Philosophy in Environmental Science: Large River Ecosystems in the Western Region at its new Riverfront Campus in the Quad Cities. The proposed program is built on four key elements: (1) WIU's strong history and commitment to river-related research; (2) the University's geographic location on the Mississippi River in the Quad Cities; (3) interest of prospective students and employers in the region for a program one of this kind; and (4) the University's strong commitment to inter-multidisciplinary scholarship, teaching, and research. The University's initial feasibility study included polling potential students, environmental professionals, and educational professionals who work in the Upper Mississippi River basin and throughout the western region. The polls included representatives from external groups such as the Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers. The responses were overwhelmingly affirmative from both potential students and employers.

A five-member multidisciplinary committee of senior faculty members was responsible for developing the Ph.D. in Environmental Science: Large River Ecosystems. The disciplinary affiliations of the members include geography, biological sciences, and mathematics, and committee included the Dean of the College of Arts and Sciences. External stakeholders such as the U.S. Army Corps of Engineers, U.S. Fish & Wildlife Services, and River Action (a major environmental nongovernmental organization working in the Upper Mississippi River Basin) assisted.

As the only Illinois state-supported university located on the Mississippi River, WIU is uniquely positioned to establish itself as a leader in multidisciplinary, doctoral-level research and education related to the environment of large river ecosystems with the upper Mississippi River floodplain serving as a living laboratory. The proposed multidisciplinary, research-based doctoral program is expected to allow WIU to provide coherence to the field of large river ecosystem science, broaden the advanced training to its students, enhance opportunities for faculty engagement in scholarship and research, directly support regional economic and community development, advance WIU's position as a leader in environmental research on the Upper Mississippi River, and contribute to the sustainability of the nation's river systems.

Once approved by the Illinois Board of Higher Education (IBHE), it is expected that the program will build on the strengths of existing institutes and degree programs offered by the University, including the B.S. in Agriculture, B.S. and M.S. in Biology, B.S. and M.S. in Geography, B.S. in Meteorology, the B.S. and M.S. in Chemistry, B.S. in Geology, Post-

Baccalaureate Certificates in Zoo/Aquarium Studies, Minor in Environmental Studies, Certificate in Environmental Geographic Information Science, the Illinois Institute for Rural Affairs, and the Institute for Environmental Studies. The program will benefit from working closely with key regional organizations such as the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers.

## **Need**

*1050.30(a)(6): A) The unit of instruction, research or public service is educationally and economically justified based on the educational priorities and needs of the citizens of Illinois; B) The unit of instruction, research or public service meets a need that is not currently met by existing institutions and units of instruction, research or public service.*

To assess the occupational and student needs for this doctoral program, discussions were held with representatives of stakeholder groups, including relevant federal resource management agencies, professional societies, and nongovernmental organizations. Additionally, the employment outlook for potential graduates of the program was investigated as a key indicator of need for the program.

Support for developing the program in western Illinois came from representatives or leaders of organizations including the U.S. Army Corps of Engineers' Rock Island District, the U.S. Army Corps of Engineers' Environmental Research and Development Command, the U.S. Fish & Wildlife Service, River Action, and the Natural Land Institute. To demonstrate the level of their commitment to the proposed program, a Memorandum of Understanding was signed with the U.S. Army Corps of Engineers and the U.S. Fish & Wildlife Service. In exchanges with these entities, the need for environmental specialists with advanced training was frequently cited as a key to meeting both existing and emerging needs of the region. The discussions, without advertising the program, led to identification of 12 prospective individuals from these organizations as a potential initial cohort of students, each of whom currently resides in the University's service region and holds at least one graduate degree in biological sciences, geography, anthropology/archeology, and/or planning. Each prospective student holds a position of responsibility in an environmental field and has expressed interest in the Ph.D. program as a means to increase personal knowledge and for professional advancement.

A survey was conducted by WIU's College of Arts & Sciences' Western Survey Research Center to ascertain the level regional environmental stakeholders' interest in such a program. The survey was sent to a total of 188 people via email, primarily attendees of the recent *Upper Mississippi River Conference: Weaving Multiple Uses into Sustainable River Communities*. This group did not include the 12 potential students already identified above. Forty-one percent of the respondents held master's or professional degrees while 38 percent were bachelor's degree holders. Eleven respondents identified themselves as "very likely to apply for the doctoral program if it is offered by WIU and an additional 14 were "somewhat likely" to apply for the program. Overall, the results of the surveys were that 25 of the respondents were very likely to apply for the program plus an additional 12 possible prospects identified much earlier.

Based on the multidisciplinary nature of a program in environmental sciences with a large river ecosystems focus, graduates of the proposed program would hold a wide variety of positions, including managers of national environmental regulatory programs, independent environmental researchers and policy advisors, and college and university faculty.

To determine the number of jobs that may be available for graduates of this program in the near future, data were collected from federal sources in addition to data from *The Chronicle of Higher Education*, the National Council for Science and the Environment's Council of Deans and Directors, and the Association of Environmental Engineering and Science Professors.

Additional supporting information was obtained from the Illinois Department of Employment Security (IDES), the state agency responsible for projecting occupational demands in the state. According to IDES' employment projections in 2010-2020, employment for environmental scientists and specialists is expected to grow by 11.5 percent and by 11 percent for geoscientists, hydrologists, and geographers compared to 8.6 percent, the average for all Illinois occupations. However, projections in the Bureau of Labor Statistics' *Occupational Outlook Handbook* are higher than the projections for the occupations in Illinois. The projections are 19 percent for environmental scientists and specialists during the 2010-2020 period. These data show occupations that will be served by the proposed doctoral program will experience growth in employment above the average for all occupations. No higher education institution in the upper Midwest currently offers a doctoral degree program in environmental sciences with a large river ecosystems focus or a closely related discipline.

### ***The Illinois Public Agenda for College and Career Success***

WIU's proposed Ph.D. in Environmental Science: Large River Ecosystems will address Goals 3 and 4 of *The Illinois Public Agenda*.

Goal 3, to *increase the number of high-quality post-secondary credentials to meet the demands of the economy and an increasingly global society*, will be addressed by educating and graduating students in the program and contribute to increasing the number of high quality doctoral degree recipients in a science, technology, engineering and mathematics (STEM) field.

Goal 4, to *better integrate Illinois' educational, research, and innovation assets to meet economic needs of the state and its regions*, will be addressed by the program and its graduates engaging in research and to expand the existing collaboration with the U.S. Army Corps of Engineers, the U.S. Fish & Wildlife Service, and other entities for the betterment of the environment and to contribute to the state's economic development.

### **Comparable Programs in Illinois**

No Illinois university currently offers a degree program in environmental sciences with a large river ecosystems focus. In fact, no program is offered in the Midwest, and perhaps in the nation. However, a few universities in the state offer degree programs in environmental science and closely related fields, including Illinois Institute of Technology, Southern Illinois University Carbondale, and the University of Illinois campuses at Chicago and Urbana-Champaign.

### **Mission and Objectives**

*1050.30(a)(1): A) The objectives of the unit of instruction, research or public service are consistent with the mission of the college or university; B) The objectives of the unit of instruction, research or public service are consistent with what the unit title implies.*

WIU's Ph.D. in Environmental Science: Large River Ecosystems is designed to achieve a number of objectives, including to mentor students to become recognized for their distinctive academic training and be sought after for positions of responsible charge in academic,

government, and private sector employment; to train scholars who will create new knowledge based on fundamental research and solve environmental problems at the regional, state and national levels; and to produce graduates who are critical thinkers with the skills necessary to develop and manage complex solutions to open-ended environmental challenges.

To meet these objectives, by the end of the program each student is expected to:

- Acquire and apply advanced knowledge and skills in fundamental physical, chemical, and biological processes in large river ecosystems, and the unique interactions, non-ideal conditions, etc., that distinguish environmental processes in large river ecosystems from others;
- Understand and apply the latest scientific methodologies to assess environmental processes in large river ecosystems;
- Develop quantitative tools to model environmental processes in large river ecosystems;
- Independently define problems, formulate hypotheses, design and conduct experiments, interpret data, and report findings on one or more areas relevant to large river ecosystems;
- Identify gaps in the current knowledge of environmental issues in large river ecosystems and develop approaches to fill those gaps; and
- Communicate effectively in writing and orally, the results of research findings to the public and professionals in the discipline.

The aims of the program are consistent with and support the University's mission and priorities and they address the goals of *The Illinois Public Agenda for College and Career Success*. The title of the degree program correctly depicts the key attributes of the proposed program.

### **Curriculum and Assessment**

*1050.30(b)(1): A) The caliber and content of the curriculum must assure that the objectives of the unit of instruction will be achieved. B) The breadth and depth of the curriculum must be consistent with what the title of the unit of instruction implies. C) The admission and graduation requirements for the unit of instruction must be consistent with the stated objectives of the unit of instruction. D) Institutions must show the capacity to develop, deliver and support academic programs. Procedures and policies that will assure the effective design, conduct and evaluation of the degree program under the academic control of the institution must be developed. Assessment plans must demonstrate that the institution has identified clear and appropriate program and student learning goals and has defined appropriate outcomes. Appropriate data must be collected and may be requested by the Board to show the level of student learning that has occurred as a result of participation in the institution's programs of study. E) Degree programs must meet [appropriate] requirements.*

### **Admission Requirements**

Environmental science is a multidisciplinary field. As such, requirements for admission to the proposed program vary depending on the students' background and how closely their master's degree is related to the doctoral program. Probationary admission may be granted to students who did not earn a master's degree in environmental science or a closely related academic major. In addition, every student must submit Graduate Record Examination, General Test scores. Students whose native language is not English must submit their scores on the Test

of English as a Foreign Language. Also, applicants must submit at least three letters of reference from individuals who can provide meaningful comments about the relevance and adequacy of their academic and professional backgrounds. Applicants must also submit statements of research interest in environmental science.

Applicants who do not have strong backgrounds in environmental science may be granted probationary admission. For example, a student who has earned a traditional master's degree in mathematics with little or no coursework in environmental science could be granted probationary admission to this program. In this case the student's records would be evaluated by the Program's Director who would give the student a list of academic requirements to be met for full admission to the program. The Director would monitor the student's progress until the student has completed all identified academic deficiencies in this program.

## Curriculum

The curriculum of the Ph.D. in Environmental Science: Large River Ecosystems consists of at least 60 semester hours beyond the master's degree in environmental science or a closely related discipline. A student whose background is not closely related to environmental science will complete additional courses depending on his or her individual needs. Five 700-level courses in the program: Environmental Systems, Advanced Analytic Tools in Environmental Science, Integrated Environmental Decision Making, Dissertation Research, and Dissertation, comprise the core courses that every student in the program must complete. A student may complete up to 30 semester hours in the Dissertation Research and the Dissertation courses because the program emphasizes high level and independent student competency in research. To balance the emphasis with the need for sufficient breadth and depth of coursework, every student must complete at least five graduate level elective courses comprising at least 16 semester hours selected in consultation with the student's Doctoral Examining Committee. The elective courses will be supported by at least 13 courses from disciplines closely related to environmental science.

Examples of the elective courses are:

- Advanced Ecological Techniques
- Limnology
- Environmental Chemistry
- Computer Simulation
- Environmental Impact Analysis
- Applied Statistical Methods
- Probability Theory and Stochastic Processes

Because the proposed doctoral program is a research intensive degree, every student will be required to complete a research dissertation. The dissertation requirements for the program includes: passing the Preliminary Examination; working on a dissertation topic approved by the student's Dissertation Committee; completing the dissertation; and defending it orally before the Dissertation Committee consisting of five graduate faculty members, including the Dissertation Chair. The oral dissertation defense must be approved by at least four members of the Dissertation Committee. The dissertation must meet all dissertation requirements of WIU's School of Graduate Studies.

## Assessment of Student Learning Outcomes

Assessment of student learning in this program will be accomplished using a number of evaluation tools including tests, quizzes and exams in program courses. Each student must maintain a minimum 3.25 grade point average throughout the program. In addition, evaluation of each student's performance in the Preliminary Examination, review of the dissertation research topic by dissertation committee, evaluation of the completed dissertation by the committee members, and the evaluation and approval of the dissertation oral defense by at least four of the five members of the Committee are required for program completion. It is expected that students will present dissertation-related research at state and national conferences.

## Program Assessment

Consistent with the IBHE staff requirements, the University will submit to the IBHE a progress report on the Ph.D. in Environmental Science: Large River Ecosystems program at the end of the third year of operation. The report will summarize key areas of accomplishments by the faculty and any remaining challenges and how each challenge will be addressed. In addition, the program faculty will participate in the University's eight-year program review process to assess the program using multiple measures including evaluation of faculty teaching in the program by students; the level of faculty research, scholarship and public service, awards and honors; retention and graduation rate of students in the program; and the level of alumni and employer satisfaction with the program. The faculty will use measures such as the percent of graduates employed in occupations closely related to the discipline and the number of presentations made at state and national conferences as well as publications of graduates and the faculty of this program. A summary of the program review, including the program's strengths and weaknesses, as well as steps to be taken to improve the program, will be submitted by the University to the IBHE with summaries of other programs reviewed in the same cycle.

## Facilities (space, equipment, instructional materials)

*1050.30(a)(4): A) Facilities, equipment and instructional resources (e.g., laboratory supplies and equipment, instructional materials, computational equipment) necessary to support the high quality academic work in the unit of instruction, research or public service are available and maintained; B) Clinical sites necessary to meet the objectives of the unit of instruction, research or public service; C) Library holdings and acquisitions, owned or contracted for by the institution, that are necessary to support high quality instruction and scholarship in the unit of instruction, research and public service, are conveniently available and accessible, and can be maintained.*

WIU plans to offer the proposed program at its new campus in the Quad Cities, the Riverfront Campus. Phase I of the Riverfront Campus is completed, and the facilities have been in operation since 2012. The building includes laboratories, classrooms, and offices. Phase II of the campus development is in progress with the second facility being built. The building in Phase II will include teaching laboratories, two laboratory preparation rooms, and two research laboratories and appropriate offices for faculty of the program. Phase II of the campus development is expected to be completed and opened in Fall 2014, which is the earliest time the Ph.D. program can be inaugurated with its first group of students. In addition to these facilities, preliminary consideration has been made to incorporate additional research laboratory space in Phase III build-out of the campus. This option will be included as the Design Steering Committee continues its work on Phase III. The University expects the current facilities at the Riverfront Campus, together with facilities that will be available when Phase II of the campus

development is completed, will be adequate to support the proposed Ph.D. program. Additional facilities will be available to support this program when Phase III of the campus development is completed.

#### Technology and Instructional Resources

To meet all coursework and research requirements for the Ph.D. program, additional well-equipped laboratory facilities and equipment will be needed. The University has a plan to address the need in the Phase II of the Riverfront Campus development for which implementation has begun. The Phase III development of the campus will include meeting any needed instructional technology and research resources for this program. The needed equipment will have broad applications in aquatic sciences as well as other related fields to be utilized by faculty and students in the proposed program and other disciplines. By focusing the purchase and subsequent management of major analytic science equipment as a “core” need, the basic needs for the Ph.D. program will be met. The costs of some highly specialized equipment and facilities will be partially met by charging students served modest fees.

In addition to other available instructional technology, WIU uses Desire2Learn, a web-based learning management system, to deliver online courses and to enhance courses taught in the traditional classrooms. This platform will be used in conjunction with existing teleconferencing capabilities as the primary technology-based instructional resources for the proposed program. The University has been one of the leaders in developing and using instructional technology involving telecommunication in Illinois. To meet the specialized needs for computers and software related specifically to geospatial data analysis as well as advanced modeling and decision-support software for this program, a plan has been developed for this program to team with other prospective users of similar resources to reduce costs.

#### Library

WIU has indicated it has most of the library resources to support the proposed program. Resources that are not available at this time will be acquired in the next year or two as the program is implemented. The library materials that will support this program include textbooks, text and electronic journals, databases, and interlibrary resources providing 24/7 access from a consortium of academic libraries to which the University library is a member.

Twelve reference books vital to the doctoral program are listed, including: *Ecological Assessment of Aquatic Resources: Linking Science to Decision-Making*, *Dynamic Modeling of Environmental Systems*, *Large Rivers: Geomorphology and Management*, *Statistics for Environmental Science and Management*, *Environmental Science: Systems and Solutions*, *Environmental Decision-Making: An Integrative Quantitative Approach*, *Essential Environmental Science Methods and Techniques*, *The Science and Management of River Environments*, *Standard Methods for the Examination of Water and Wastewater*, and *Integrated Watershed Management: Principles and Practices*.

Many electronic journals will support this program, including 27 representative journals listed in the proposal. Examples of the 27 journals are: *Bulletin of the Ecological Society of America*, *Ecological Management & Restoration*, *Environmental and Ecological Statistics*, *Environmental Engineering Science*, *Environmental Management*, *Environmental Science and Technology*, *Journal of Water Resources Planning and Management*, and *River Research and Applications*. Also, 23 major databases relevant to environmental science and large river ecosystems will be used in this program. As a member of the Illinois consortium of academic

libraries, WIU's students and faculty members have a 24/7 access to the library resources of the consortium. Additionally, the University's library is a member of ILLiad/WorldCAT Resource Sharing Network. The network links physical and digital resources of over 10,000 libraries worldwide.

## **Faculty and Staff**

*1050.30(a)(3): A) The academic preparation and experience of faculty and staff ensure that the objectives of the unit of instruction, research or public service are met.*

A five-member, multidisciplinary committee of senior faculty members was responsible for developing the proposal for the Ph.D. in Environmental Science: Large River Ecosystems. Their disciplinary affiliations are in geography, biological sciences, and mathematics, and the committee also included the Dean of the College of Arts and Sciences. The proposal for the program indicates that 21 faculty members with earned Ph.D.s in appropriate disciplines will be responsible for the Ph.D. in Environmental Science: Large River Ecosystems. Seven of the 21 faculty members are full professors and nine of them are associate professors. Together they represent several disciplines: atmospheric sciences, biological sciences, civil and environmental engineering, geography, geology, and mathematics. Each faculty member is involved in research and each has taught and supervised undergraduate and graduate students. A few are responsible for postdoctoral scholars. Some of the faculty members are very productive researchers and have published extensively. Among the leading researchers, one has received multi-million dollar grants and contract awards more than once. Another has received more than 50 grants and contracts over 30 years of academic work. Some of the faculty members received notable awards and honors. All faculty members are active in their respective academic and professional organizations and some are leaders in the organizations, including serving as members of editorial boards or committees, elected officials, and members of conference planning committees. The number and variety of academic expertise of the faculty responsible for the proposed program are commensurate with the multidisciplinary nature of environmental science and large river ecosystems.

In addition to the existing faculty members, two new tenure-line faculty members will be recruited after the program is approved by IBHE to bring the faculty of this program to full strength. Duties and responsibilities of the new faculty members will include teaching core courses and program electives and serving as research advisors for students.

## **Fiscal and Personnel Resources**

*1050.30(a)(5): A) The financial commitments to support the unit of instruction, research or public service are sufficient to ensure that the faculty and staff and support services necessary to offer the unit of instruction, research or public service can be acquired and maintained; B) Projections of revenues necessary to support the unit of instruction, research or public service are based on supportable estimates of state appropriations, local tax support, student tuition and fees, private gifts, and/or governmental grants and contracts.*

No new state resources are needed to offer the Ph.D. in Environmental Science: Large River Ecosystems because current and future resources will be adequate to meet the needs of the program. Some of the vital resources are existing faculty and facilities, tuition paid by students in this program, and resources to equip the Phase II of the Riverfront Campus development which will be completed by Fall 2014, as well as developments, including a building being planned for Phase III of the campus development. The budget to support this program is projected to grow

from \$434,468 in the first year to \$543,215 in the fifth year. Approximately \$210,000 to \$313,000 of the budgets in the first and fifth years will pay for the two to three planned new faculty hires. In addition, over \$170,000 will pay for supplies, services, and equipment annually. Any essential unmet need of this program will be addressed by the College and the University.

### **Accreditation and Licensure**

*1050.30(b)(3): Appropriate steps shall be taken to assure that professional accreditation needed for licensure or entry into a profession as specified in the objectives of the unit of instruction is maintained or will be granted in a reasonable period of time.*

*1050.50(a)(1): Three years after approval of a new program, the institution shall provide a program progress report to the Board as part of the institution's annual report. The third year progress report shall describe the institution's performance in meeting program objectives and show where any improvements are necessary. The placement of a program in voluntary temporary suspension will not negate the requirement of submitting a third year progress report.*

*1050.50(a)(2)(C): Requirement for Programs in which State Licensure is Required for Employment in the Field: In the case of a program in which State licensure is required for employment in the field, a program can be found to be in good standing if the institution is able to provide evidence that program graduates are eligible to take the appropriate licensure examination and pass rates are maintained as specified in the objectives of the unit of instruction. If there is no such evidence, the institution shall report the program as flagged for review.*

There is currently no specialized accreditation for degree programs in fields related to environmental science and large river ecosystems. However, WIU is accredited by the Higher Learning Commission (HLC) of the North Central Association of Schools and Colleges. The HLC accreditation covers all degree programs offered by the University.

### **Program Information**

*1050.30(b)(2)(A): The information the institution provides for students and the public...(B) The information listed in subsection (b)(2)(A) shall be available to prospective students prior to enrollment and shall be included in the institution's catalog of programs.*

Information about WIU's Doctor of Philosophy in Environmental Science: Large River Ecosystems, including a detailed description of the curriculum, admission requirements, tuition, fees and other cost information, as well as university and graduate school policies, will be published on the University's website, [www.wiu.edu](http://www.wiu.edu). Comparable information about the program will be published in the University's catalog and similar information may be available from the College of Arts and Sciences and the School of Graduate Studies upon request.

**Staff Conclusion.** The staff concludes that the Doctor of Philosophy in Environmental Science: Large River Ecosystems program proposed by Western Illinois University meets the criteria to implement the Board of Higher Education Act (110 ILCS 205/et.seq.) as set forth in 23 Illinois Administrative Code, Ch. II, Section 1050.30, and the Illinois Board of Higher Education policies pertaining to assessment and accreditation for licensure.

The staff recommends adoption of the following resolutions:

*The Illinois Board of Higher Education hereby grants to Northern Illinois University authorization to establish the Master of Science in Financial Risk Management in the West Suburban Region subject to the institution's implementation and maintenance of the conditions that were presented in its application and that form the basis upon which this authorization is granted.*

*The Illinois Board of Higher Education hereby grants to the University of Illinois at Urbana-Champaign authorization to establish the Grainger Center for Electric Machinery and Electromechanics in the Prairie Region subject to the institution's implementation and maintenance of the conditions that were presented in its application and that form the basis upon which this authorization is granted.*

*The Illinois Board of Higher Education hereby grants to Western Illinois University authorization to establish the Doctor of Philosophy in Environmental Science: Large River Ecosystems in the Western Region subject to the institution's implementation and maintenance of the conditions that were presented in its application and that form the basis upon which this authorization is granted.*