GRADUATE CERTIFICATE IN ADVANCED ELECTRIC POWER ENGINEERING
Electrical and Computer Engineering Department

I. General Description

This proposal recommends establishing a “Graduate Certificate in Advanced Electric Power Engineering” through the Electrical and Computer Engineering Department. Students completing this Certificate will further develop their competencies in electric power engineering. Students enrolling in this certificate will have a Bachelor’s degree in Electrical Engineering, or a degree in a closely related field with at least 3 years experience working in the electric power engineering field.

II. Catalog Description

The Graduate Certificate in Advanced Electric Power Engineering program provides the student with advanced knowledge of the operation and design of electric power systems.

II. Rationale

The U.S. electric energy industry is facing a shortage of engineering talent. This was the topic of the NSF Workshop on the Future of Power Engineering Workforce held in November 2007. This workshop, co-sponsored by the IEEE Power Engineering Society, brought together utility executives, government regulators, and academics. In discussing employment trends with several energy industry employers, it is apparent that a large proportion of their engineering staff is within 5-7 years of retirement and there is a shortage of early to mid career engineers. This workplace demographic is a result of the uncertainties that arose during the recent restructuring of the electric utility industry. During this period, utilities, uncertain of their future, cut back on the hiring of engineers.

To correct this problem, employers have become more aggressive in hiring graduating engineers and have become interested in retraining existing engineering staff. They recognize their need for highly trained staff in order to handle their research and development needs as well as the application of new technology.

Due to a decline in the number of Electric Power programs throughout the country, many of the new electrical engineers the utilities, consulting firms, and power equipment manufacturers will hire will not have a strong electric power background. In addition, many of these companies’ existing engineering staffs do not have a strong background in electric power.

This Certificate program is designed, in consultation with electric utilities, to address these educational needs. It is based upon our successful offering online of our course work Masters of Science in Electrical Engineering. Some of the engineers do not want an MS degree, but do want some formal recognition of having taken a coherent body of work.

All of the lecture courses will be offered online to accommodate engineers’ work schedules.
III. Related Programs

The Graduate Certificate in Advanced Electric Power Engineering is related to the proposed Certificate in Electric Power Engineering and to the Electric Power programs contained in the BS, MS and PhD programs in Electrical Engineering. This Certificate uses the same courses as the existing degree programs.

There are similar courses offered on-line from Arizona State, Kansas State, and the University of Idaho. A certificate program will be a differentiator which will make our program more appealing.

IV. Projected Enrollment

It is expected that we will have a steady state enrollment of 10-15 students.

V. Scheduling

No change in the time scheduling of the existing courses is anticipated. EE4221 and EE4222 will be delivered in a studio classroom to accommodate the on-line delivery. The other courses are already delivered on-line.

VI. Curriculum Design

Required Courses (3 Credits)
EE 5200 – Advanced Methods in Power Sys – 3

Elective Courses (12 or more Credits, no more than 3 below 5000)
EE 4221 – Power System Analysis 1 – 3
EE 4222 – Power System Analysis 2 – 3
EE 5220 - Transient Analysis Methods – 3
EE 5223 - Power System Protection – 3
EE 5230 - Power System Operations – 3
EE 5240 – Computer Modeling of Power Systems – 3
EE 5250 – Distribution Engineering – 3
EE 5260 - Wind Power – 3
EE 5290 - Selected Topics in Power Systems – 3
EE 6210 - Power System Dynamics and Stability – 3

Total Credits 15 or more

VII. New Course descriptions

Not applicable

VIII. Library and other Learning Resources

Students in this program will need only the Library resources presently available to all enrolled students.
IX. Computing Access Fee

Students enrolled in this Certificate will be charged the same fees and follow the same policies as those enrolled in the Master’s of Science in Electrical Engineering program.

X. Faculty Resumes

(see attached) L.J. Bohmann, B.A. Mork, D.O. Wiitanen

XI. Need equipment

No special equipment is needed for this program

XII. Program Costs

All the courses are existing courses and are presently being taught on a regular basis.

All the existing courses except EE 4221 and EE 4222 are already taught online. ETS has indicated that they can accommodate these additional online courses.

XIII. Space

No additional space is needed

XIV. Policies, Regulations, and Rules.

Students may apply the credits earned for this certificate toward a graduate degree at Michigan Technological University.

XV. Accreditation Requirements

None

XVI. Internal Status of the proposal.

Approved by the College of Engineering

XVII. Planned Implementation Date

As soon as approved.
SOME ANALYSIS:

Strategic Plan Goals

The strategic plan calls for an increase in the number of graduate students, to approximately 1250 by 2012.

The envisaged student population includes 750 MS students and 500 PhD students.

With these goals, what is the expected rate of graduation of MS and PhD per year?

With 750 MS students, and an average 3 year completion rate, expect 250 MS graduates per year. Assuming that only 75% of the students actually complete their degree (25% attrition rate), the expected number of MS graduates per year is $\rightarrow 188$

With 500 PhD students, and an average 5 year completion rate, expect 100 PhD graduates per year. Assuming that only 75% of the students actually complete their degree (25% attrition rate), the expected number of PhD graduates per year is $\rightarrow 75$

What does that mean for individual departments/faculty members (on average)?

Assuming faculty numbers equal to the three-year average:
Current total number of faculty in MS granting units (T/Tt FTEs) = 280.46
Current total number of faculty in PhD granting units (T/Tt FTEs) = 274.12

If each MS faculty has (on average) 2.5 MS students, and MS students take (on average) 3 years to graduate, and there is a 25% attrition rate, then every faculty member in a MS granting unit can graduate $\rightarrow 0.63$ MS/year

➢ Total expected MS graduation rate: 175/year

If each PhD faculty has (on average) 1.75 PhD students, and PhD students take (on average) 5 years to graduate, and there is a 25% attrition rate, then every faculty member in a PhD granting unit can graduate $\rightarrow 0.26$ PhDs/year

➢ Total expected PhD graduation rate: 72/year

Note: The numbers of students per faculty would be lower if the attrition rate and/or the times to degrees are overestimated.

Discussion?
Resolution Regarding Graduate Scholars, Fellows, Trainees and Assistants

Acceptance of an offer of financial support (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by a prospective or enrolled graduate student completes an agreement that both student and graduate school expect to honor. In that context, the conditions affecting such offers and their acceptance must be defined carefully and understood by all parties.

Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this Resolution. In those instances in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment has been made. Similarly, an offer by an institution after April 15 is conditional on presentation by the student of the written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to the above Resolution that a copy of this Resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.

The following list includes CGS member institutions that indicated their support of the Resolution.

This Resolution was renewed September 2004.

Abilene Christian University
Air Force Institute of Technology
Alcorn State University
Alfred University
American University
Andrews University
Angelo State University
Appalachian State University
Arizona State University
Arkansas State University
Auburn University
Austin Peay State University
Ball State University
Baylor College of Medicine
Baylor University
Bloomsburg University of Penn.
Boise State University
Boston College
Boston University
Bowling Green State University
Bradley University
Brandeis University
Brigham Young University
Brown University
Bryn Mawr College
Caltech
California Institute of Technology
California State Polytechnic University, Pomona
California State University, Bakersfield
California State University, Fresno
California State University, Fullerton
California State University, Hayward
California State University, Long Beach
California State University, Los Angeles
California State University, Northridge
California State University, Sacramento
California State University, Stanislaus
California University of Pennsylvania
Case Western Reserve University
Catholic University of America
Central Michigan University
Central Missouri State University
Central Washington University
City University of New York Graduate Center
Clark Atlanta University
Clark University
Clonmel University
Cleveland State University
College of New Jersey
College of Saint Rose
College of William and Mary
Colorado School of Mines
Columbia University
Concordia University, River Forest
Coppin State College
Cornell University
Creighton University
Dartmouth College
Drew University
Drexel University
Duquesne University
East Carolina University
East Central University
East Tennessee State University
Eastern Illinois University
Eastern Kentucky University
Eastern Michigan University
Eastern Washington University
Emerson College
Emory University
Emporia State University
Fayetteville State University
Fielding Graduate Institute
Fitchburg State College
Florida A & M University
Florida Atlantic University
Florida International University
Florida State University
Fordham University
Fort Hays State University
Gallaudet University
George Mason University
George Washington University
Georgetown University
Georgia Institute of Technology
Georgia Southern University
Georgia State University
Hampton University
Harvard University
Hebrew Union College - Jewish Institute of Religion
High Point University
Hofstra University
Hood College
Howard University
Idaho State University
Illinois Institute of Technology
Illinois State University
Indiana State University
Indiana University
Indiana University - Purdue University Fort Wayne
Indiana University of Pennsylvania
Iowa State University
Jackson State University
Johns Hopkins University
Kansas State University
Kent State University
Lamar University
Langston University
Lehigh University
Loma Linda University
Louisiana State University and A & M College
Louisiana State University
Health Sciences Center
Loyola Marymount University
Loyola University of Chicago
Marquette University
Marshall University
Massachusetts Institute of Technology
Medical College of Georgia
Medical College of Ohio
Medical College of Wisconsin
Medical University of South Carolina
Miami University
Michigan State University
Michigan Technological University
Middle Tennessee State University
Minnesota State University - Mankato
Mississippi State University
Montana State University - Bozeman
Montclair State University
Mount Mary College
Murray State University
National University
Naval Postgraduate School
New Jersey Institute of Technology
New Mexico State University
New York Medical College
New York University
North Carolina Agricultural & Technical State University
North Carolina State University
at Raleigh
North Dakota State University
Northeastern Illinois University
North Central University
Northern Arizona University
Northern Illinois University
Northern Michigan University
Northwestern State University of Louisiana
Northwestern University
Nova Southeastern University
Oakland University
Ohio State University
Ohio University
Oklahoma State University