

UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. A [checklist](#) is available to assist in the preparation of a proposal. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: John A. Madsen phone number x1608

Department: Center for Carbon-free Power Integration email address jmadsen@udel.edu

Date: 2/21/2014

Action: Add Graduate Certificate in Wind Power Science, Engineering and Policy

(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 14F
(use format 04F, 05W)

Current degree _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: Graduate Certificate in Wind Power Science, Engineering and Policy
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

Revising or Deleting:

Undergraduate major / Concentration: _____
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: _____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: _____
(**Must attach** your Graduate Program Policy Statement)

Graduate Program of Study: _____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: _____

Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.

List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the [Course Challenge](#) list. If there are no new courses enter “None”)

GEOL663 – Geological Aspects of Offshore Wind Power

MAST613 – Wind Power Meteorology

MAST680 – Renewable Energy and Climate: Law, Regulation and Environment

MEEG622 - Materials Tribology

These courses provide depth within the three focus areas, and may also serve as elective courses, within this graduate certificate program. GEOL663 and MAST613 are courses under the Wind Power Science area of focus; MAST680 is a Wind Power Policy course; and MEEG622 is under the Wind Power Engineering area of focus for this graduate certificate program.

Supply support letter from the Library, Dean, and/or Department Chair if needed

(all new majors/minors will need a support letter from the appropriate administrator.)

A support letter from the Dean of the College of Earth, Ocean and Environment (CEOE) is attached. The proposed graduate certificate program was approved by a unanimous vote of CEOE’s Academic Council.

Supply a resolution for all new majors/programs; name changes of colleges, departments, degrees; transfer of departments from one college to another; creation of new departments; requests for permanent status. [See example of resolutions.](#)

N/A

Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education: <http://www.ugs.udel.edu/gened/>

N/A

Identify other units affected by the proposed changes:

(Attach permission from the affected units. If no other unit is affected, enter “None”)

The Departments of Geological Sciences, Geography, Electrical Engineering and Mechanical Engineering, the School of Marine Science and Policy and the Program in Energy and Environmental Policy will be affected by the enrollment of students in the courses to be offered for completion of this certificate. E-mail messages of support for these courses from the Chairs and Directors of the affected units are attached. The proposal has been approved by a unanimous vote of CEOE’s Marine Policy faculty.

Describe the rationale for the proposed program change(s):

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

The College of Earth, Ocean, and Environment (CEOE) is proposing to offer an interdisciplinary graduate certificate in Wind Power Science, Engineering, and Policy. The Certificate program courses are taught by faculty from Marine Science and Policy, Mechanical Engineering, Electrical and Computer Engineering, Geography, and Geological Sciences. This interdisciplinary graduate certificate program will be administered by CEOE.

The concept of a graduate certificate program originated in discussions between UD faculty having research and teaching interests in wind power. The group included Drs. Willett Kempton, Jeremy Firestone, Dana Veron, Cristina Archer, and John Madsen from CEOE and David Burris, Keith Goossen, and Ajay Prasad from the College of Engineering. Further impetus for the certificate came from recommendations from an external advisory group with representatives from the wind industry that was part of a Department of Energy grant in which Dr. Kempton was the Principal Investigator. During subsequent meetings of UD’s Center for Carbon-free Power Integration (<http://www.carbonfree.udel.edu/index.html>), the philosophy, structure, and coursework for the certificate

was designed.

The goal of the Wind Power Science, Engineering, and Policy certificate is to give graduate students and professionals a broad understanding of the wind energy industry from multiple disciplinary perspectives. Wind power is a rapidly growing and evolving field that crosses traditional academic disciplines and increasingly requires practitioners who understand the relationships among the various components of wind turbines, the environment, regulations, and society. Those aspiring to work and advance in the field must have a basic understanding of wind turbine mechanical and electrical systems, including the integration of variable generation into the electrical grid, the multiple factors (e.g., meteorological, ecological, geological, cultural) governing selection of optimum sites to locate wind power projects, the economics and regulatory policies governing wind power, and the complex ways in which society's understanding and acceptance of renewable energy power generation can impact wind projects.

The Wind Power Science, Engineering, and Policy graduate certificate from UD will provide evidence that the student has taken a broad range of courses covering these aspects at an institution known for its cutting edge interdisciplinary and collaborative wind power research and education. While there is an emphasis on offshore wind power, most of the courses apply equally to wind power either on land or in the ocean or airborne. The certificate course of study may be taken in conjunction with a graduate degree in a traditional discipline at the University, or may be taken as a stand-alone program. Some courses may be taken remotely, but others are offered only via in-class attendance at UD's Newark or Lewes campuses. Some courses in the program will have specific prerequisite requirements, for example, calculus or electrical engineering, but the variety of courses offered will make the certificate accessible to anyone with an undergraduate degree.

We anticipate that this proposed graduate certificate will appeal to three types of students. First, it will appeal to students already accepted into a graduate UD program who are looking for formal recognition of their wind power expertise. The certificate provides concrete evidence that can be presented as part of a job application. Second, for students focused on one specific area of wind power research, it provides coverage of related areas affecting understanding of interacting systems (e.g., a student specializing in turbine blade design needs to understand meteorology, as well as the loads imposed on the drive train by the rotor). Finally, this program may appeal to working professionals not in a degree program, who need to understand more about the wind industry in order to more effectively do their jobs or who seek advancement.

All graduate students and professionals that successfully complete the requirements will receive a UD Wind Power Science, Engineering, and Policy certificate showing evidence of their accomplishment. Successful completion of the certificate requirements for students matriculated in UD graduate programs will also be noted on their transcripts.

STATEMENT OF RESOURCES REQUIRED TO IMPLEMENT AND SUSTAIN THIS GRADUATE CERTIFICATE PROGRAM

The College of Earth, Ocean, and Environment with the Center for Carbon-Free Power Integration will implement and administer this proposed Graduate Certificate. The College, as stated by Dean Nancy Targett in her support letter, is committed to serve the students in this certificate program while working closely with colleagues throughout the university who are working on wind issues.

The proposed Wind Power Science, Engineering, and Policy graduate certificate program is composed of existing and, if successfully passed through the challenge process, four new courses. All of the new courses have previously been taught as experimental courses as part of normal teaching loads for the faculty instructors. Further, all of the courses offered in the certificate program will satisfy requirements for other degree programs and will be taught as normal teaching loads. Thus, no new, or additional, faculty resources are required to offer this program.

The faculty point of contact for students enrolled in this certificate program will be Dr. John Madsen in the Department of Geological Sciences and the Center for Carbon-free Power Integration. His involvement with the program will be part of his normal load of teaching and service. Dr. Madsen will coordinate with Dr. Janis Lopez, Assistant Dean for Graduate Services in the College of Earth, Ocean and Environment, on the administration of the graduate certificate program including interactions with the Office of Graduate Studies concerning completion of program requirements and awarding of certificates.

The administration of this certificate program requires no new, or additional, resources.

Program Requirements:

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.) [See example of side by side.](#)

Graduate Certificate Program in Wind Power Science, Engineering, and Policy

Admission Requirements

Admission to this graduate certificate program requires an undergraduate degree from an accredited university or college.

Certificate Requirements

To attain this graduate certificate, 12 credits of coursework must be completed as follows:

- 3 credits from the required course: MAST628 Offshore Wind Power: Science, Engineering, and Policy
- Total of 6 credits (minimum of 2 credits from each area) from courses listed within the focus areas of 1) Wind Power Science,
2) Wind Power Engineering, and 3) Wind Power Policy
- 3 credits from elective wind power courses

All coursework applied towards the certificate’s required 12 credits must be completed with a letter grade of B- or higher

Only one course applied towards the certificate’s required 12 credits can be used to satisfy requirements of any other UD Graduate Certificate

Wind Power Science, Engineering and Policy courses

	<u>Credits</u>	
MAST628 Offshore Wind Power: Science, Engineering, and Policy	3	
Wind Power Science Courses		
ELEG615 Electric Power and Renewable Energy Systems	3	
GEOL663 Geological Aspects of Offshore Wind Power	3	
MAST613 Wind Power Meteorology	3	
Wind Power Engineering Courses		
ELEG614 Basic Electrical Machines and Power	1	
MEEG635 Wind Power Engineering	3	
MEEG622 Materials Tribology	3	
Wind Power Policy Courses		
ENEP802 Electricity Policy and Planning	3	
MAST680 Renewable Energy and Climate: Law, Regulation and Environment	1-3	
MAST/UAPP 692-010 Environmental Values, Movements & Policy	3	
MAST622/UAPP626 Conservation and Renewable Energy Policy	3	

ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson _____ Date _____

Dean of College _____ Date _____

Chairperson, College Curriculum Committee _____ Date _____

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

Vice Provost for Academic Affairs & International Programs _____ Date _____

Provost _____ Date _____

Board of Trustee Notification _____ Date _____

Revised 02/09/2009 /khs



March 5, 2014

MEMORANDUM

TO: Dr. John A. Madsen, Associate Professor

FROM: Dr. Nancy M. Targett
Dean

SUBJECT: Support for proposed Graduate Certificate in Wind Power Science, Engineering and Policy

I write to formalize my support for the Graduate Certificate in Wind Power Science, Engineering and Policy that has been submitted to the Faculty Senate.

The admission criteria, certificate requirements and included courses all serve to provide a strong balance of the theoretical and multidisciplinary underpinnings and a practical approach to real issues and demands of the wind industry now and in the future.

Wind power, the most powerful potential carbon-reducing energy source for East Coast states, is ready for launch but stalled for lack of strategic initiative, cooperative effort, and information sharing. Recent UD initiatives will provide timely, independent and cutting-edge information and expertise and will catalyze new partnerships moving forward in the industry. A workforce is and will continue to be needed that has a synthesized understanding of the science, policy and engineering aspects of the industry. This certificate program will add to the knowledge of our students in these areas and help them be better practitioners and innovators in the field.

The Center for Carbon-Free Power Integration and the College of Earth, Ocean, and Environment stand ready to implement and administer this proposed Graduate Certificate. We are committed to serve our students while working closely with our colleagues throughout the university who are working on wind issues.

If you have questions or require additional information, please feel free to contact me.

E-mail Message of Support for Courses in Certificate Program from Chair/Director of affected unit.

Dr. Mark Moline, Director, School of Marine Science and Policy (MAST courses)

Moline, Mark Alan <mmoline@udel.edu>
To: "Madsen, John A" <jmadsen@udel.edu>

Wed, Feb 26, 2014 at 9:39 AM

Hi John,

Yes, sorry to have missed the meeting but was overbooked with a pressing meeting on the Cannon Renovations (timeline has been moved up significantly). I read the proposal and also endorse it. I can confirm that SMSP will offer MAST 628 in support as well as the elective courses you mention below.

Regards,

Mark

John Madsen <jmadsen@udel.edu>
To: Mark Moline <mmoline@udel.edu>

Tue, Feb 25, 2014 at 8:54 PM

Hi Mark,

We missed you at the last CEOE Academic Council Meeting (it was the type of meeting that I like - out of there in about 20 minutes!).

I'm putting the finishing touches on the proposal for CEOE's Graduate Certificate in Wind Power Science, Engineering, and Policy. The Council approved the program at our last meeting. I've attached a copy of the proposal.

Could you send me an e-mail confirmation that SMSP will periodically offer the following courses in support of the Certificate Program?

MAST628 Offshore Wind Power: Science, Engineering, and Policy. This course is required for the certificate.

The remaining courses are electives that a student could possibly take to satisfy requirements for the certificate.

MAST613 Wind Power Meteorology
MAST680 Renewable Energy and Climate: Law, Regulation and Environment
MAST/UAPP692-010 Environmental Values, Movements, and Policy
MAST622/UAPP626 Conservation and Renewable Energy Policy

Let me know if you have any questions.

Thanks!
John M.

Dr. John A. Madsen
Department of Geological Sciences
University of Delaware
Newark, DE 19716
jmadsen@udel.edu

E-mail Message of Support for Courses in Certificate Program from Chair/Director of affected unit.

Dr. John Byrne, Director, Center for Energy and Environment Policy (ENEP course)

Wind certificate course

1 message

John Byrne <jbnov@yahoo.com> Wed, Feb 26, 2014 at 12:41 PM

Reply-To: John Byrne <jbnov@yahoo.com>

To: "jmadsen@udel.edu" <jmadsen@udel.edu>

Cc: Gwen Looby glooby@udel.edu

Hi John,

We're happy to be listed.

But please list the course as ENEP 802 only. This course is owned by CEEP and we pay from s-contracts from CEEP's budget to have adjuncts teach the course. I have copied our Academic Program Coordinator, Gwen Looby, who can help with registration matters. As you can understand, ENEP grad student majors will receive priority in enrollment.

Good luck with this initiative!

Regards, John

John Byrne, Director and
Distinguished Professor of
Energy and Climate Policy Phone: (302) 831-8405
Center for Energy & FAX: (302) 831-3098
Environmental Policy
University of Delaware Website: <http://ceep.udel.edu/>
Newark, DE 19716-7301 USA Biosketch: <http://ceep.udel.edu/Bios/Byrne.pdf>

E-mail Message of Support for Courses in Certificate Program from Chair/Director of affected unit.

Dr. James Pizzuto, Chair, Department of Geological Sciences (GEOL course)

Approval for GEOL663 in Graduate Certificate Program

1 message

James Pizzuto <pizzuto@udel.edu> Wed, Feb 26, 2014 at 9:00 AM

To: John Madsen <jmadsen@udel.edu>, James Pizzuto pizzuto@udel.edu

This email is to confirm that the Department of Geological Sciences will periodically offer GEOL663 in the near future, assuming that the course can "enroll" when offered and that Dr. John Madsen is available to teach it (no other faculty members are qualified to offer this course).

Best,
Dr. James Pizzuto
Professor and Interim Chair

E-mail Message of Support for Courses in Certificate Program from Chair/Director of affected unit.

Dr. Kenneth Barner, Chair, Department of Electrical and Computer Engineering (ELEG courses)

Confirmation to offer courses in support of Wind Graduate Certificate

2 messages

Barner, Kenneth E. <barner@udel.edu> Wed, Feb 26, 2014 at 8:29 AM

To: "Madsen, John A" <jmadsen@udel.edu>

Cc: "Goossen, Keith W" goossen@udel.edu

John:

The ECE department will indeed periodically offer these courses. The department also approves of including them in the proposed program.

Ken

Sent from my iPad

Kenneth E. Barner
Professor & Chair
Department of Electrical and Computer Engineering
University of Delaware Newark, Delaware 19716
Phone: (302) 831-6937 Fax: (302) 831-4316
Email: barner@udel.edu Web: www.ece.udel.edu

John Madsen <jmadsen@udel.edu> Tue, Feb 25, 2014 at 9:11 PM

To: Kenneth Barner barner@udel.edu

Dr. Barner,

The College of Earth, Ocean, and Environment is proposing to offer an interdisciplinary graduate certificate in Wind Power Science, Engineering, and Policy. A copy of the proposed program is attached.

Two courses within Electrical Engineering, ELEG615 Electric Power and Renewable Energy Systems and ELEG614 Basic Electrical Machines and Power are listed as elective courses that a student could take to satisfy requirements in wind power science courses and wind power engineering courses, respectively.

Could you e-mail me with confirmation that your Department will periodically offer these courses so that they would be available to students enrolled in the certificate program?

Let me know if you have any questions concerning the program.

Thanks!

John M.

Dr. John A. Madsen
Department of Geological Sciences
University of Delaware
Newark, DE 19716
jmadsen@udel.edu

E-mail Message of Support for Courses in Certificate Program from Chair/Director of affected unit.

Dr. Suresh Advani, Chair, Department of Mechanical Engineering (MEEG courses)

Advani, Suresh G <advani@udel.edu> Tue, Feb 25, 2014 at 9:09 PM
To: "Madsen, John A" jmadsen@udel.edu

OK. I confirm that we will offer these courses periodically

John Madsen <jmadsen@udel.edu> Tue, Feb 25, 2014 at 9:07 PM
To: "Advani, Suresh G" <advani@udel.edu>

Hi,

Thanks for the quick response. Periodically is approximately once every three or four semesters. For example in Geology, I'll be teaching GEOL663 Geological Aspects of Offshore Wind Power - I have generally offered it every other year.

John M.

Dr. John A. Madsen
Department of Geological Sciences
University of Delaware
Newark, DE 19716
jmadsen@udel.edu

Advani, Suresh G <advani@udel.edu> Tue, Feb 25, 2014 at 9:04 PM

To: "Madsen, John A" jmadsen@udel.edu

What does periodically mean ?

We may not be able to hire these electives in the future if we do not have adequate faculty to teach our required courses

John Madsen <jmadsen@udel.edu> Tue, Feb 25, 2014 at 9:02 PM
To: Suresh Advani <advani@udel.edu>

Dr. Advani,

The College of Earth, Ocean, and Environment is proposing to offer an interdisciplinary graduate certificate in Wind Power Science, Engineering, and Policy. A copy of the proposed program is attached.

Two courses within Mechanical Engineering, MEEG635 Wind Power Engineering and MEEG622 Materials Tribology are listed as elective courses that a student could take to satisfy a requirement in wind power engineering courses.

Could you e-mail me with confirmation that your Department will periodically offer these courses so that they would be available to students enrolled in the certificate program?

Let me know if you have any questions concerning the certificate program.

Thank-you,
John M.

Dr. John A. Madsen
Department of Geological Sciences
University of Delaware
Newark, DE 19716