

Departmental and faculty opportunities in CIRE

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Director

Center for Interdisciplinary Research and Graduate Education

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For College of Arts and Sciences Department Heads

Energy Science and Engineering doctorate

- **New interdisciplinary Energy Science and Engineering PhD**
 - Provides breadth while ensuring a “deep dive” in a specific area
 - Specialty areas chosen to resonate with DOE priorities
 - Initial specialties: nuclear energy, bioenergy, energy conservation and storage, renewable energy, distributed energy and grid management, environmental and climate sciences related to energy
 - Entrepreneurial component
- **Traditional PhD with a concentration in ESE**
 - Includes the same knowledge breadth and entrepreneurship core as the ESE PhD
 - Student takes a conventional PhD in a department with a minor or concentration in ESE

This new PhD program will be administered and housed in the Center for Interdisciplinary Research and Graduate Education

Center for Interdisciplinary Research and Graduate Education (CIRE)

- **January 2010:** Tennessee General Assembly passed legislation authorizing UT to establish an academic unit at UTK for interdisciplinary research and graduate education in collaboration with ORNL - CIRE
- **The goals of CIRE are to:**
 - Increase the number of UTK STEM PhD students
 - Enhance research collaborations between UTK and ORNL
 - Solve problems of national significance in energy-related areas
- **February 2010:** Thom Mason and Jimmy Cheek chartered a UTK-ORNL Task Force to create and implement CIRE
 - Wayne Davis and Jim Roberto co-chairs
- **May 2010:** UTK and ORNL entered into an agreement to develop CIRE
 - This includes facilitating an increase in ORNL staff who hold faculty appointments at UTK and can supervise doctoral research
- **June 2010:** internal search for a director - Lee Riedinger hired effective September 1

The case for CIRE

- Combines the educational resources of a research university and the research capabilities of a national laboratory
- Provides expanded opportunities for graduate students in energy-related sciences and engineering
 - Multidisciplinary research
 - Large-scale problem-oriented research projects
 - Entrepreneurship
- Expands the UTK graduate research campus, increasing research opportunities and capacity
- Leverages Lab staff, facilities, and research programs to increase the number of graduate students and mentors in energy-related areas
- Expands research capacity at ORNL while developing future scientists and engineers in DOE mission areas



CIRE Board of Directors

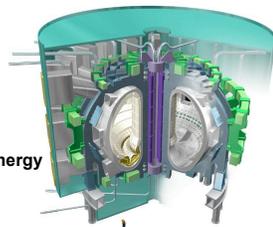
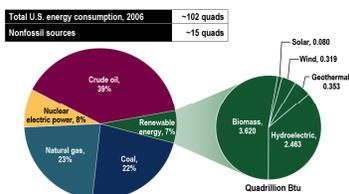
Name	Affiliation	Title
Beierschmitt, Kelly	ORNL	Director, Nuclear Operations Directorate Executive Director of the High Flux Isotope Reactor
Daverman, Bob	UT	Professor, Department of Mathematics
Davis, Wayne	UT	Dean, College of Engineering Professor, Department of Civil & Environmental Engineering
Hodges, Carolyn	UT	Vice Provost & Dean of the Graduate School
Keller, Martin	ORNL	Associate Laboratory Director, Biological & Environmental Sciences
Khomami, Bamin	UT	Professor & Head, Department of Chemical & Biomolecular Engineering
Liu, Yiliu	UT	Governor's Chair Professor, Department of Electrical Engineering and Computer Science
Miller, Alex	UT	Associate Dean of Academic Programs, College of Business William B. Stokely Professor of Management
Nichols, Jeff	ORNL	Associate Laboratory Director, Computing & Computational Sciences Directorate
Parang, Masood	UT	Associate Dean & Professor, Academic & Student Affairs, College of Engineering
Roberto, Jim	ORNL	Director for Strategic Capabilities UT-Battelle Senior Vice President for Contract Retention
Sorensen, Soren	UT	Professor & Head, Department of Physics
Stewart, Neal	UT	Professor & Ivan Racheff Chair of Excellence, Department of Plant Sciences

ESE curriculum overview

- **Core Curriculum (6 credits)**
ESE 511 and ESE 512 Introduction to Energy Science and Technology (3, 3 credits)
- **Knowledge Breadth Curriculum (6 credits):** two courses from following areas
 - Political, social, legal, ethical and security issues related to energy (3-4 courses, each 3 credits)
 - Entrepreneurship, leadership, and management (3-4 courses, each 3 credits).
 - Environmental and climate sciences related to energy (3-4 courses, each 3 credits)
- **Knowledge Specialization Curriculum (15 credits)**
Choose five courses from participating department as defined in CIRE Graduate Student Handbook
 - Nuclear energy
 - Bioenergy and biofuels
 - Renewable energy
 - Energy conversion and storage
 - Distributed energy and grid management
 - Environmental and climate sciences related to energy
- **ESE 599 Seminar (3 credits; 1+1+1):** Topical seminars in the focus areas of CIRE

ESE six major areas of research and 10 national energy challenges

- **Nuclear energy**
 1. Close the nuclear fuel cycle
 2. Find an inexhaustible source of energy
- **Bioenergy and biofuels**
 3. Develop a new generation of ethanol
- **Renewable energy**
 4. Lower the cost of solar power
- **Energy conversion and storage**
 5. Store alternative energy
 6. Design high-mileage cars
- **Distributed energy and grid management**
 7. Modernize the electric grid
 8. Reduce energy consumption
- **Environmental and climate sciences related to energy**
 9. Respond to climate change
 10. Store carbon emissions



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Energy Science and Engineering courses for catalogue

- ESE 502 Registration For Use of Facilities (1-15 credit hours)
- ESE 511 Introduction to Energy Science and Technology I (3)
- ESE 512 Introduction to Energy Science and Technology II (3)
- ESE 593 Independent Study (1-3)
- ESE 597 Special Topics (1-3)
- ESE 599 Seminar (1)
- ESE 600 Doctoral Research and Dissertation (3-15)
- ESE 697 Special Topics (1-3)

Committee chaired by Bamin Khomami has mapped out existing courses (500 and 600 level) for specialization in the six major energy tracks

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Financial model for ESE PhD program

- Recruit 20 to 40 new PhD students per year
- \$28K annual stipends
- Support by the CIRE program until a research group is chosen from possibilities presented by CIRE faculty
- Coverage for student before a research group is chosen comes from an indirect cost agreement with Chancellor
 - ORNL group pays for stipend, tuition, insurance plus 26% F&A
 - University returns to CIRE the full 26% for student support
 - ORNL research group is expected to cover part of financial package when student chooses group and full package after two years of coursework
- Model works only if 75% of students are supported by ORNL research groups
- State of TN has appropriated \$6.2M (one-time funds) for CIRE, to cover:
 - Administrative staff - 75% of director; 10% of assistant director (Mike Simpson); financial person; secretary
 - Recruiting expenses
 - Initial first-year coverage of students in *start-up* mode
 - Operating expenses
 - Occasional faculty support for teaching an uncovered course

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CIRE faculty

- We have no funded faculty lines
- ORNL researchers or existing UTK faculty will be brought into CIRE for a portion of their time
 - ORNL researchers will be Joint Faculty with CIRE (0% time UTK so we don't have to pay their salaries)
- Applications will be sought for CIRE faculty based on:
 - Strong record of research in one of six CIRE energy areas of research
 - Willingness to commit required resources (time, research support, expertise, etc.) to CIRE activities
- Expectations of CIRE faculty
 - Active engagement in CIRE activities, including mentoring, recruiting, teaching, course development, and committee service
 - Commitment to supervise and support at least one graduate student at any given time, and to ensure timely completion of the PhD
 - Annual submission of descriptions of research opportunities, potential dissertation topics, and shorter research topics available in their groups

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Advantages of being a CIRE faculty member

- Access to top graduate students from across the country by virtue of the extensive recruiting efforts of ORNL
 - Higher stipend than we normally pay is needed to compete in this market
 - Credit for guiding and funding an ESE PhD student will be shared with the department
- Reduced cost for students while they are taking course work in first two years
- Strong collaborations with appropriate ORNL research groups
- Ability to compete for new funding opportunities under the CIRE banner
 - Research incentive fund revenue from a grant to CIRE will be shared with home department of the faculty member
- Part of an exciting new enterprise

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Opportunities for graduate students in two programs, both UTK - ORNL

- Energy Science and Engineering interdisciplinary PhD
 - Recruit 20 to 40 new PhD students per year
 - Planning on \$28K annual stipends
 - Support by the CIRE program until a research group is chosen from possibilities presented by CIRE faculty
- UTK-ORNL Distinguished Graduate Fellowships
 - Research in one or a combination of three areas:
 - Materials science and engineering, including neutron science
 - Computational science and engineering
 - Nuclear science and engineering
 - \$30K annual stipend; 3 students started this semester
 - Recruit 10 to 12 new PhD students per year



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Recruiting material

- Web site development at UT:
 - CIRE: <http://cire.utk.edu>
 - ESE: <http://ese.utk.edu>
 - DGF: <http://distinguished.utk.edu>
- Brochures are printed

Recruiting a new breed of graduate student is crucial

- Rely on robust recruiting staff and talents of ORNL
 - Shelly Lohmann is the director of University Recruiting and Fellowship Programs
 - They do regular recruiting visits to universities for their own PhD hiring needs
 - They will also recruit for our two graduate fellowship programs
- ORNL will take the lead on visits to 30 campuses this fall
 - Career Fairs / Expos
 - Information sessions
 - Additional engagement with:
 - Career centers
 - Societies
- ORNL has a host of web-based recruiting tools:
 - Dedicated Websites
 - UT-Knoxville
 - ORNL Online Career Center <http://jobs.ornl.gov>
 - Search Engine Optimization
 - Google AdWords
 - Passive Candidate Sourcing
 - NACElink (National Association of Colleges and Employers)
 - Online advertisements with each of our target universities
 - Society Conferences, Career Fairs, Online advertisements
 - Social Media - Twitter, FaceBook, YouTube



Targeted universities for recruiting grad students

ORNL's Strategic Outreach Universities

- California Institute of Technology
- Carnegie Mellon University
- Cornell University
- Duke University*
- Florida State University*
- Georgia Institute of Technology*
- Harvard University
- Louisiana State University
- Massachusetts Institute of Technology
- North Carolina State University*
- The Ohio State University
- The Pennsylvania State University
- Purdue University
- Rensselaer Polytechnic Institute
- Stanford University
- University of California– Berkeley
- University of Chicago
- University of Illinois – Urbana Champagne
- University of Michigan – Ann Arbor

ORNL Strategic Universities (continued)

- University of Tennessee – Knoxville*
- University of Texas – Austin
- University of Virginia – Charlottesville*
- University of Wisconsin – Madison
- Vanderbilt University*
- Virginia Polytechnic Institute and State University*

Tier 2 Target Universities for CIRE

- Texas A&M University
- Clemson University
- University of South Carolina – Columbia
- Michigan State University
- Arizona State University
- University of Florida – Gainesville
- Indiana University
- University of Colorado – Boulder
- Auburn University
- Washington State University

*Core University

Space for CIRE

- On campus - Greve Hall
 - History:
 - Opened in 1956 and originally known as West Hall, housed only women
 - West Hall was renamed Greve Hall in 1963, in honor of former Dean of Women Harriet Greve
 - Hall first housed male students in 1971 when it was used for overflow from other men's residence halls
 - Building closed due to economic reasons that spring and reopened as a men's residence hall in the fall of 1972
 - Residence accommodated 382 students
 - Taken out of commission as a dorm in summer of 2009
 - We have been allocated fourth floor, which contains 40 dorm rooms
 - Some renovation is needed
- At ORNL - JICS building
 - History:
 - Opened in 2002 as first of new joint institutes funded by State of TN as part of UT-Battelle bid
 - North end of JICS was used initially for ORCAS, the Oak Ridge Center for Advanced Studies
 - ORCAS died, so space is available
 - We will have the open room in the northeast corner on the first floor
 - Some renovation is needed to make a few offices in part of this space



Coordination with colleges, departments, and other centers

- Issues:
 - We will be recruiting some of the same faculty and lab researchers
 - Potential competition for the same students
 - Issues over which entity submits grant proposals
- Centers of potential overlap with CIRE
 - Joint Institute for Computational Sciences
 - Joint Institute for Biological Sciences
 - Joint Institute for Neutron Sciences
 - Joint Institute for Advanced Materials
 - Sustainable Energy Education and Research Center
 - Genome Science and Technology program
 - Institute for Secure and Sustainable Environment
 - Tennessee Solar Institute
 - Center for Renewable Carbon
- Our intent
 - Meet regularly with these center directors
 - Coordinate student recruitment
 - Share current and future happenings

