



University Network for Climate and Ecosystems Change Adaptation Research

Postgraduate Course on Renewable Energy Spring 2013

The United Nations University Institute for Sustainability and Peace (UNU-ISP), Tokyo, invites applications for its new intensive four-week postgraduate course on Renewable Energy, developed under the framework of the University Network for Climate and Ecosystems Change Adaptation Research (UN-CECAR). UN-CECAR is a collaborative initiative of more than 20 leading universities across Asia. It is committed to developing postgraduate educational and research programmes on climate and ecosystems change, and sustainability science. UNU-ISP acts as the Secretariat for UN-CECAR. This course is organized with the support of the Graduate Program in Sustainability Science- Global Leadership Initiative (GPSS-GLI) of the University of Tokyo.

The course conducted at UNU-ISP will cover a range of issues on the science, technology, economics and policies on renewable energy, including such hard topics as small hydropower, solar, geothermal, bio-, wind, marine, fuel cell and hydrogen energy and soft topics as energy demand and supply, economics, security, and policy. Students will also receive practical training with RETScreen clean energy project analysis software and HOMER energy modelling software.

The assessment for this course will be based on a research paper, presentations, class participation, and intermediate tests. The course is practically oriented and will be taught by a highly qualified and diverse team of natural and social science scholars. This course is equivalent to a regular 4 credit postgraduate course in Japan.

Target applicants for this course are those who:

- are currently enrolled in a masters or Ph.D. programme, in any discipline;
- are postgraduate students, researchers, faculty/staff of universities, government officials, international agencies and professionals in relevant professions;
- wish to deepen their knowledge on, and gain practical training in, renewable energy.

Course Information

The course runs for four weeks, from *February 26, 2013 to March 22, 2013*. The postgraduate course focuses on the science, technology, economics and policies of renewable energy. Students who successfully complete the course will be awarded a certificate of completion and a transcript from UNU-ISP.

The course is designed to be worth 4 credits and comprises 30 hours of teaching time. While a number of universities have negotiated credit transfer agreements with UNU-ISP, ultimate decision on credit transfer will be made by the student's university. Please note that topics listed below may be subject to change.

Renewable Energy Course — 4 credits

Introduction: Energy, Climate Change and Global Sustainability

- Sustainable Development
- Climate Change
- Role of Energy
- General Introduction to Energy
- Role of Renewable Energy
- Advantages and Disadvantages of Renewable Energy Systems

Solar Energy- PV, Solar Thermal Technology, Solar Energy and Low Energy Architectures

- Introduction and Operating Principle
- Potential/ Resource Assessment
- System Components
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Energy Resources Classification, Potential and Characteristics

- Classification of Energy Resources
- Reserves and Potential of Fossil and RE
- Types of Renewable Energy
- Characteristics of Fossil and Renewable Energy Resources

Geothermal Energy

- Introduction and Operating Principle
- Geothermal Resource Potentials
- System Components
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Energy Demand and Supply

- Energy Units and Conversion Factor
- Primary, Secondary, Final and Useful Energy
- Global and National Energy Demand and Supply
- Energy Balance in the National Context
- Energy Planning and Forecasting
- Rural and Urban Energy

Bioenergy

- Introduction
- Types of Bio-resources
- Potential
- Characteristic of Bio-resources
- Technology and Applications (Thermal, Chemical and Biochemical Conversion)

Small Hydropower

- Introduction and Operating Principle
- Potential/ Resource Assessment
- System Components
- Basic Turbine Classifications
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Wind Energy

- Introduction and Operating Principle
- Resource Potential
- Types of Wind Turbines
- System Components
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Marine Energy Systems

- Introduction to Marine Energy Systems - Tidal, Wave, OTEC, Marine Current
- Potential
- Operating Principles
- System Components
- Applications and Case Studies
- Basic Performance and Cost
- Future Trends and Constraints

Fuel Cell and Hydrogen Energy System

- Introduction and Operating Principle
- Types of Fuel Cells and Hydrogen Production Systems
- Basic Performance and Cost
- Applications and Case Studies
- Future prospects, Constraints and Trends

Energy Storage Systems

- Introduction
- Types of Energy Storage Systems- Chemical, Mechanical, Pumped Storage, Container, Thermal
- System Components
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Renewable Hybrid Systems

- Introduction and Operating Principle
- Types of RE Hybrid Systems
- System Components
- Basic Performance and Cost
- Applications and Case Studies
- Future Prospects, Constraints and Trends

Energy Economics and Policies

- Energy Policies Development and Trends
- Subsidies, Incentives and Taxes
- Policies for Renewable Energy Promotion
- Climate Mitigation Policies and Renewable Energy
- Externalities
- Lifecycle Cost of Renewable Energy
- Economic Decision Making of Energy Project

Hands-on Training

Participants will be provided with renewable energy case studies, which they would be analyzing using RETScreen, and submit a prefeasibility project report.

Renewable Energy and Environment

- Greenhouse Gas Emission and Impacts
- GHG Mitigation through Renewable Energy
- Local Pollutants Mitigation Through Renewable Energy
- Health Benefits of Renewable Energy

Renewable Energy and Society

- Awareness on Renewable Energy and its Impact on Society
- Public Participation in Developing and Managing Renewable Energy Projects
- Low Carbon Society

Energy Security and Politics

- Transition of Energy System and Geopolitics of Energy
- Definition of Energy Security
- Importance of Energy Security
- Indicators of Energy Security
- Renewable Energy in Energy Security

Renewable Energy Market and Commercialization

- Status of Renewable Energy Market
- Future of Renewable Energy Market
- Commercialization Aspect of Renewable Energy
- CDM and Micro Credit
- Community Based Renewable Energy System
- Economic and Financial Aspect of Smart

Renewable Energy Project Planning and Development

- Demand and Resource Identification
- Technology Choices and Optimization
- Financial Issues and Risk
- Project Plan
- Tools for RE Project Assessment and Optimization

Faculty and Learning Environment

Students will benefit from working closely with highly experienced faculty members comprised of distinguished UN-CECAR scholars and practitioners, and UNU-ISP academic staff. UNU-ISP also shares a building with many UN agencies which makes it a unique learning environment.

The UNU Library offers access to a wide range of academic books, over 10,000 electronic journals, World Bank and OECD publications, and official UN documents. All students will receive a comprehensive library orientation session at the beginning of the course.

A dedicated computer lab will be provided for students, with software to cater to the needs of each course. An online tool will be provided for students to lecture notes, reading lists and other materials specific to each course, as well as a message board and forum to facilitate discussion among faculty and students.

Student Support Services and Housing

UNU-ISP will assist students through the course, acknowledging that students may experience difficulties in adjusting to a new country and culture. Students will be provided accommodation (in an affordable hotel close to UNU) during their stay in Tokyo.

Daily Schedule

There will be three sessions of courses each weekday: 10:00–12:00, 13:00–15:00 and 16:00–18:00 hours.

Please address specific queries to:

- Application procedure, acceptance policies, and student logistics (Ms. Wilma James, UNU-ISP, james@unu.edu)
- Program content, resource persons and collaboration (Ms. Soo Huey Teh, UNU-ISP, teh@unu.edu)

Fees

Tuition fee: **USD 2,000 (JPY 172,000)**

A limited number of fellowships (covering tuition fees, and/or living expenses) are available for outstanding students from developing countries and who could demonstrate a need for financial assistance. All students are expected to pay for their own travel expenses.

Eligibility and Application

Applicants must provide:

- A completed Application & Fellowship Form with photo and signature;
- Proof of enrolment in a master's or Ph.D. degree programme if you are a postgraduate student;
- Original transcript of academic record;
- A detailed proposal of the research topic, and explain how it will link the current university thesis topic to that of climate change if you are a postgraduate student;
- TOEFL scores or equivalent proof of English-language proficiency for non-native speakers or those who do not have an academic degree in an English-speaking country; and
- Minimum of two references.

The application deadline for the Spring 2013 course is **January 23, 2013** for students from abroad and for students within Japan.

For detailed information on the application and admission procedures, please visit the UN-CECAR website at: <http://cecar.unu.edu/re-courses> and to apply, please visit: <http://cecar.unu.edu/apply>.

University Network for Climate and Ecosystems Change Adaptation Research (UN-CECAR)

Established in 2009 as the first of its kind in the region, UN-CECAR is an institutional platform of universities across Asia that seeks to enhance education and research on adaptation to climate change and ecosystems change, and to build the emerging sustainability science discipline. Specific objectives of the Network are to:

- collect international-level knowledge on climate change adaptation and customize it to the local level;
- assess existing and emerging climate change-related research and degree programmes in the region, and identify areas of most need;
- initiate and support the development of joint- or dual-degree educational programmes, credit-sharing common courses, joint research and training programs

Visit <http://cecar.unu.edu/>



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United Nations University

Promoting science for human security, peace and sustainable development

The mission of the United Nations University is to contribute, through collaborative research, capacity building and advisory services, to efforts to resolve the pressing global problems of human survival, development and welfare that are the concern of the United Nations, its Peoples and Member States.

The UN University comprises a worldwide network of institutes, presently located in 13 different countries and coordinated by the UN University Centre in Tokyo.

UNU Institute for Sustainability and Peace (UNU-ISP)

Located in Tokyo, the UNU Institute for Sustainability and Peace (UNU-ISP) was established in January 2009. UNU-ISP takes an innovative, integrated approach to sustainability - one that encompasses global change, development, peace and security. The Institute bridges these cross-cutting issues through research, educational and collaborative initiatives with the aim of solving current problems and anticipating future challenges. UNU-ISP works in collaboration with other UNU institutes as well as through co-operative relationships with the global academic and policy-making communities.

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