Course Title
Master of Science in Sustainable Energy Management

Master Degree: Master of Science Program in Sustainable Energy Management

Academic Institution: Faculty of Environmental Management, Prince of Songkla University, Hat Yai campus

Duration: Two years

Objectives: To educate master students who are able to efficiently apply their knowledge of energy management and science to be the basement of the sustainable development morally for both national and international level.

Course Synopsis/Methodology

<table>
<thead>
<tr>
<th>Plan</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A; A2</td>
<td>36</td>
</tr>
</tbody>
</table>

- Compulsory courses 9 credits
- Elective courses 9 credits
- Thesis 18 credits

Course Contents/Studies Topic
Integration between science and social science related to energy aspects e.g. environmental impact from energy activities, economical aspects from energy business, and social view regarding to energy consumption and production.

Compulsory courses 9 credits
820601 Environmental Research Methodology* 3(3-0-6)
831804 Seminar in Sustainable Energy Management* 1(0-2-1)
835605 Basics of Energy Systems 3(3-0-6)
835606 Sustainable Energy Systems 3(3-0-6)

* No credit (Result in grade of S=Pass, U=Fail)

Include the Energy and Environmental Law at least 3 hours

Elective Courses 9 credits
(Choose at least 1 course from elective course type 1 and at least 1 course from elective course type 5)

- Elective course Type 1: Energy Science and Resources
  830601 Environmental Geology 3(3-0-6)
  830602 Climate Change and Ecosystem 3(3-0-6)
831811 Renewable Energy Science 3(3-0-6)
831812 Potential and Conversion of Energy 3(3-0-6)
831813 Energy Crop 3(3-0-6)

- Elective Course Type 2: Management of Technology and Energy Business
  831821 Technology Management 3(3-0-6)
  831822 Marketing and Financial Analysis in Energy Business 3(3-0-6)
  831823 Energy Business and Cost Accounting 3(3-0-6)
  831824 Energy and Economics Policy 3(3-0-6)
  835601 Decision Making for Energy Conservation and Management 3(3-0-6)

- Elective course Type 3: Physical Chemical and Biological Energy Technology
  333651 Smart Materials and Applications 3(3-0-6)
  831516 Biotechnology Innovation 3(3-0-6)
  831831 Polymer Membrane: Basic and Applications 3(3-0-6)
  831832 Membrane Technology for Gas Separation 3(3-0-6)
  835517 Biotechnology for Energy and Environment 3(3-0-6)
  835519 Bio-fuel Technology 3(3-0-6)

- Elective course Type 4: Environment and Energy
  825604 Law for Environmental Management 3(3-0-6)
  831841 Design for Energy and Environment 3(3-0-6)
  831843 Safety and Occupational Health in Energy Activity 3(3-0-6)
  831844 Environmental Impact Assessment for Power Plant 3(3-0-6)
  835515 Energy Conservation and Management 3(3-0-6)

- Elective course Type 5: Energy and Society
  831851 Energy in Community 3(3-0-6)
  831852 Public Participation in Energy Business 3(3-0-6)
  831853 Awareness in Energy Saving) 3(3-0-6)
  831854 Corporate Social Responsibility from Energy Sector) 3(3-0-6)
  831855 Personnel Management in Energy Business) 3(3-0-6)

- Specialization Elective course
  831890 Special Topics in Energy and Environment) 3(3-0-6)

- Thesis
  831900 Thesis 18(0-54-0)
  831901 Thesis 36(0-108-0)
  831902 Thesis 48(0-144-0)
*Note. Students may select any course offered for Master degree or Doctoral degree in Prince of Songkla University curriculum. However, the selected course must be approved by curriculum supervisor or thesis advisor.

**Study Plan: Plan A; A 2**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
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<tbody>
<tr>
<td>First Year, Semester 1</td>
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<tr>
<td>820601 Environmental Research Methodology</td>
<td>3</td>
</tr>
<tr>
<td>831804 Seminar in Sustainable Energy Management (*No-credit)</td>
<td>1</td>
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<tr>
<td>835605 Basics of Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>Elective course</td>
<td>3</td>
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<td><strong>Total</strong></td>
<td><strong>9</strong></td>
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<tr>
<td>First Year, Semester 2</td>
<td></td>
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<tr>
<td>831804 Seminar in Sustainable Energy Management (*No-credit)</td>
<td>1</td>
</tr>
<tr>
<td>835606 Sustainable Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>Elective course</td>
<td>3</td>
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<tr>
<td>Elective course</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>Second Year, Semester 1</td>
<td></td>
</tr>
<tr>
<td>831804 Seminar in Sustainable Energy Management (*No-credit)</td>
<td>1</td>
</tr>
<tr>
<td>831-900 Thesis</td>
<td>9</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
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<tr>
<td>Second Year, Semester 2</td>
<td></td>
</tr>
<tr>
<td>831-804 Seminar in Sustainable Energy Management (*No-credit)</td>
<td>1</td>
</tr>
<tr>
<td>831-900 Thesis</td>
<td>9</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

**Course Descriptions**

**Compulsory courses 9 credits**

- **820601 Environmental Research Methodology***
  3(3-0-6)
  The searching of data for research, research paradigm, quality and quantity analysis, basic statistics, the writing of proposal, thesis, and academics articles in the context of energy under environment topic

- **831804 Seminar in Sustainable Energy Management***
  1(0-2-1)
  Energy research towards the sustainable developments by invited guest speaker seminar in order to understand the system, innovative and critical thinking, and opinion exchange including the ability to present by the students
835605 Basics of Energy Systems 3(3-0-6)
Definition of energy, the overview report of energy supply and consumption, the scope of energy conservation and renewable energy, the energy conversion and the fundamental of energy conversion, the country and world energy situation, energy balance and the system energy problem approach

835606 Sustainable Energy Systems 3(3-0-6)
Efficient energy resource management, Energy Management in factories and buildings covering both Thai patterns and standards according to ISO 50001, participation in energy conservation, the sustainable development including the using of renewable energy and its impact and its relevant: economics, social aspects, and environment

Elective courses

Elective course Type 1 (Energy Science and Resources)

830601 Environmental Geology 3(3-0-6)
Principles of geology and their application to environmental science; topics of study include natural disasters, planning and development of projects sensitive to geological context, application of remote sensing and geographic information system (GIS), the problems of human impacts on soil and water, conservation and mitigation measures

830602 Climate Change and Ecosystem 3(3-0-6)
Overview of climate change science, energy balance and radiative transfer; greenhouse effect and global warming; natural causes of climate change; paleo-climate and future climate changes; assessment of climate change induced by anthropogenic causes; exchanges, sources and sinks of greenhouse gases in the ecosystem; impact of climate change on the ecosystem; adaptation and vulnerability of the ecosystem

831811 Renewable Energy Science 3(3-0-6)
Concept of development of the renewable energy e.g. hydro energy, wind energy, solar energy, biomass, biogas, nuclear, and others compared with the energy from fossil

831812 Potential and Conversion of Energy 3(3-0-6)
Survey and estimation of the potential of hydro energy, wind energy, solar energy, biomass, biogas, nuclear, and others including fossil energy
Possibility of utilization of energy crop including relevant technologies, cultivation, breeding, maintenance, energy production, and the related effect from using energy crop

**Elective course Type 2 (Management of Technology and Energy Business)**

**831821 Technology Management**
Roles of technology and its needs, technology selection, the preparation and development by concerning economy and social aspects

**831822 Marketing and Financial Analysis in Energy Business**
The marketing and financing in energy business, the satisfaction of customers, marketing planning, marketing analysis, financial analysis, competitor analysis and customer behavior, market segment, differentiation and positioning, life cycle of product and market communication

**831823 Energy Business and Cost Accounting**
Energy business cost accounting, standard cost, variable cost accounting system, budget planning and its flexibility, cost accounting for controlling and decision making of executives

**831824 Energy and Economics Policy**
Balance of the growth of economics and energy consumption, the economics knowledge in analyzing the allocation of the energy using, the gearing of policy direction and the roles of the government proactively in determining the sustainable option appropriately and systematically, the revision of the of energy consumption options at the local, country, and global level

**835601 Decision Making for Energy Conservation and Management**
Profile of energy demand, power development plan, and load forecast in relation to sustainable environmental management, appropriate modern decision making model under the certainty, risk, and uncertainty including the AHP at both micro and macro scales, critical energy policy levels

**Elective course Type 3 (Physical Chemical and Biological Energy Technology)**

**333651 Smart Materials and Applications**
Definition of smart materials and systems types of smart materials shape memory alloys piezoelectric ceramics, smart polymer, preparation of smart materials Self-assembly smart materials in energy application in electronics etc.
831516 Biotechnology Innovation 3(3-0-6)
Emerging concepts in environmental biotechnology; biotechnology for environmental benefits: current and future trends in science, innovative technology and policy; environmental biotechnology research and development towards sustainability

831831 Polymer Membrane: Basic and Applications 3(3-0-6)
Basic knowledge of polymer membrane and its property improvement, membrane structure in environment, and the application of membrane for food, drug, bio-product, water supply production and waste water treatment, and etc.

831832 Membrane Technology for Gas Separation 3(3-0-6)
The preparation and production of membrane by various technic for gas separation and energy production, application of membrane for gas separation and nano-particle in the process of fuel production

835517 Biotechnology for Energy and Environment 3(3-0-6)
Principles of biotechnology; bioconversion to energy; bioethanol, methane, hydrogen and algal biodiesel production; biomonitoring; biosensor; cellular and molecular tools, biotreatment; bioremediation; aerobic and anaerobic water treatment, microbial leaching of heavy metals; environmental genomics and proteomics

835519 Bio-fuel Technology 3(3-0-6)
Greenhouse gas mitigation, biofuel life cycle, development of biofuel, potential of biomass such as agricultural and livestock residues, type of biofuels such as bioethanol, biodiesel, biomethane and biohydrogen, supply, markets of biofuel, political, economic and environmental impacts of biofuels

Elective course Type 4 (Environment and Energy)

825604 Law for Environmental Management 3(3-0-6)
An introduction to the fundamental principles and concepts of environmental law, examines the basic legal institutions and mechanisms that comprise the environmental legal system both the international environmental laws and national environmental laws as well as the legal techniques used in environmental management, factors such as politic, economic, technology, influencing the development, announcement, or modification of laws and regulations related to environmental management
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>831841</td>
<td>Design for Energy and Environment</td>
<td>3(3-0-6)</td>
</tr>
<tr>
<td></td>
<td>Design process of product or service and the allocation of design for energy and environment to go into the green market including the labeling and certification for green product both local and international level.</td>
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<tr>
<td>831843</td>
<td>Safety and Occupational Health in Energy Activity</td>
<td>3(3-0-6)</td>
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<td></td>
<td>Safety and occupational health in energy activity, prevention and control of pollution in working environment in the aspects of physical, chemical, technological, and basic safety engineering, first aids, analysis and improvement under the concept of ergonomics, and the analysis of the accident in workplace.</td>
<td></td>
</tr>
<tr>
<td>831844</td>
<td>Environmental Impact Assessment for Power Plant</td>
<td>3(3-0-6)</td>
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<td>Project detail, situation before the construction of the power plant in terms of physical status, biological status, utilizing, and quality of life, the assessment of the environmental impact, protection and reduction measures together with the monitoring measures of the environmental quality.</td>
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<tr>
<td>835515</td>
<td>Energy Conservation and Management</td>
<td>3(3-0-6)</td>
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<td></td>
<td>Efficient energy consumption and concepts of energy management in relation to sustainable environmental management, appropriate modern equipment and techniques, at both micro and macro scales, and critical energy policy levels.</td>
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**Elective course Type 5 (Energy and Society)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>831851</td>
<td>Energy in Community</td>
<td>3(3-0-6)</td>
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<tr>
<td></td>
<td>Necessity of having local energy planning, energy planning community, the relation between the local energy planning and national energy planning, and the sustainability from local energy planning.</td>
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<tr>
<td>831852</td>
<td>Public Participation in Energy Business</td>
<td>3(3-0-6)</td>
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<td></td>
<td>Theories of participatory planning in energy business, general concept and process, problem during local planning, local project planning and relation among projects, the participatory local planning in each community level.</td>
<td></td>
</tr>
<tr>
<td>831853</td>
<td>Awareness in Energy Saving</td>
<td>3(3-0-6)</td>
</tr>
<tr>
<td></td>
<td>Factors influencing the energy saving i.e. demographic data, knowledge, value, attitude, belief, and environmental concern, the understanding of each context in energy saving.</td>
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</tbody>
</table>
831854 Corporate Social Responsibility from Energy Sector 3(3-0-6)
Concept of corporate social responsibility from energy sector and its pattern, the organization and national benefit from the corporate social responsibility

831855 Personnel Management in Energy Business 3(3-0-6)
Influence of heredity and environment affect human behavior, human development, basis of human physiology, sensation and perception, learning, motive and emotion, intelligence, personality and adjustment, mental health, abnormal behavior, and social Behavior

Specialization Elective course
831890 Special Topics in Energy and Environment) 3(3-0-6)
(Current interests concerning natural resources and environment)

Thesis
831900 Thesis 18(0-54-0)
Research into new bodies of knowledge in sustainable energy management under concept of the integration between energy management and sustainable development, planning, writing and reporting research findings, all under supervision of thesis advisor

831901 Thesis 36(0-108-0)
Research into new bodies of knowledge in sustainable energy management under concept of the integration between energy management and sustainable development, planning, writing and reporting research findings, all under supervision of thesis advisor, comprehensively perform the basic of sustainable energy management

831902 Thesis 48(0-144-0)
Research into new bodies of knowledge in sustainable energy management under concept of the integration between energy management and sustainable development, planning, writing and reporting research findings, all under supervision of thesis advisor, comprehensively perform the basic of sustainable energy management and the possibility of creating the new body of knowledge

Qualification:
IELTS 5.5 or TOEFL 500 paper based or 65 internet based or 185 computer based.
Document Required:

Conceptual research proposal (1 page of A4), transcript, and recommended letter from previous advisor

Closing Date for Nominations: Online application via

http://www.grad.psu.ac.th/onlineapp.php

<table>
<thead>
<tr>
<th>Semester</th>
<th>Application Period</th>
<th>Admission Deadline</th>
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<tbody>
<tr>
<td>1st Semester</td>
<td>August - December</td>
<td>June 30th, 2018</td>
</tr>
<tr>
<td>2nd Semester</td>
<td>January - May</td>
<td>November 30th, 2018</td>
</tr>
</tbody>
</table>

Late or incomplete applications/document will not be considered.