

**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**

Plan A; A2	36	Credits
-Compulsory courses		9
-Elective courses		9
-Thesis		18

**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.

<u>Compulsory courses</u>	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

<u>Elective Courses</u>	9	Credits
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(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

First Year, Semester 1

820601 Environmental Research Methodology	3	Credits
831804 Seminar in Sustainable Energy Management (*No-credit)	1	Credits
835605 Basics of Energy Systems	3	Credits
xxxxxx Elective course	3	Credits
<b>Total</b>	<b>9</b>	<b>Credits</b>

First Year, Semester 2

831804 Seminar in Sustainable Energy Management (*No-credit)	1	Credits
835606 Sustainable Energy Systems	3	Credits
xxxxxx Elective course	3	Credits
xxxxxx Elective course	3	Credits
<b>Total</b>	<b>9</b>	<b>Credits</b>

Second Year, Semester 1

831804 Seminar in Sustainable Energy Management (*No-credit)	1	Credits
831-900 Thesis	9	Credits

Second Year, Semester 2

831-804 Seminar in Sustainable Energy Management (*No-credit)	1	Credits
831-900 Thesis	9	Credits
<b>Total</b>	<b>36</b>	<b>Credits</b>

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

831813 Energy Crop 3(3-0-6)  
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 3(3-0-6)  
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 3(3-0-6)  
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 3(3-0-6)  
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 3(3-0-6)  
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) 3(3-0-6)  
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) 3(3-0-6)  
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

- 831841 Design for Energy and Environment 3(3-0-6)  
 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
- 831843 Safety and Occupational Health in Energy Activity 3(3-0-6)  
 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
- 831844 Environmental Impact Assessment for Power Plant 3(3-0-6)  
 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
- 835515 Energy Conservation and Management 3(3-0-6)  
 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
- Elective course Type 5 (Energy and Society)
- 831851 Energy in Community 3(3-0-6)  
 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
- 831852 Public Participation in Energy Business 3(3-0-6)  
 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
- 831853 Awareness in Energy Saving 3(3-0-6)  
 Factors influencing the energy saving i.e. demographic data, knowledge, value, attitude, belief, and environmental concern, the understanding of each context in energy saving

- 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 1 8(0-5 4-0)  
 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>

Semester	Application Period	Admission Deadline
1st Semester	August - December	June 30 <sup>th</sup> , 2018
2nd Semester	January - May	November 30 <sup>th</sup> , 2018

**Late or incomplete applications/document will not be considered.**