Curriculum of Master of Science Program
In Sustainable Energy Management (International Program)
And
Curriculum of Doctor of Philosophy Program
In Sustainable Energy Management (International Program)
(Revised Curriculum 2020)

Academic Institution **Prince of Songkla University, Hatyai campus**
Faculty of Environmental Management

Section 1 General Information

1. Curriculum Name and Program

- Master of Science Program in Sustainable Energy Management (International Program)
- Doctor of Philosophy Program in Sustainable Energy Management (International Program)

2. Name of Academic Degree and Program

2.1 **Master of Science**

Full Title: Master of Science (Sustainable Energy Management)
Abbreviation: M.Sc. (Sustainable Energy Management)

2.2 **Doctor of Philosophy**

Full Title: Doctor of Philosophy (Sustainable Energy Management)
Abbreviation: Ph.D. (Sustainable Energy Management)

Section 2 Specific Curriculum Information

Philosophy

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.

To educate doctoral students who are able to analyze, evaluate and create the knowledge of energy management and science to move morally to the sustainable development for both national and international level.

Section 3 Curriculum Structure

3. Curriculum and Lecturers

3.1 Curriculum

3.1.1 Master of Science program: Number of the total credits not less than 36 credits

3.1.2 Doctor of Philosophy program: Number of the total credits not less than 48 credits

3.1.3 Curriculum Structure of Master of Science program

Plan A; A1	36 credits
-Thesis	36 credits
Plan A; A2	36 credits
-Compulsory courses	9 credits
-Elective courses	9 credits
-Thesis	18 credits

3.1.4 Curriculum Structure of Doctor of Philosophy program

Plan 1.1	48 credits
-Thesis	48 credits

3.1.5 Courses (For Master of Science and Doctor of Philosophy program)

3.1.5.1 Courses

Compulsory courses **9 credits**

831–801	(Environmental Research Methodology)*	3(3-0-6)
831-804	(Seminar in Sustainable Energy Management I)**	1(0-2-1)
831-805	(Seminar in Sustainable Energy Management II)**	1(0-2-1)
831-802	(Basics of Energy Systems)	3(3-0-6)
831-803	(Sustainable Energy Systems)	3(3-0-6)

* No credit for Master of Science program/Plan A1
Credit for Master of Science program/Plan A2

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

Elective Courses **9 credits**

Elective course Type 1: Energy Science and Resources

831-811	(Renewable Energy Science)	3((3)-0-6)
831-812	(Potential and Conversion of Energy)	3((3)-0-6)
831-813	(Energy Crop)	3((3)-0-6)
831-814	(Climate Change and Ecosystem)	3((3)-0-6)

Elective course Type 2: Management of Technology and Energy Business

831-821	(Energy Technology Management)	3((3)-0-6)
831-822	(Marketing and Financial Analysis in Energy Business)	3((3)-0-6)
831-823	(Energy Business and Cost Accounting)	3((3)-0-6)
831-824	(Energy and Economics Policy)	3((3)-0-6)
831-825	(Decision Making for Energy Conservation and Management)	3((3)-0-6)

Elective course Type 3: Physical Chemical and Biological Energy Technology

831-831	(Polymer Membrane: Basic and Applications)	3((3)-0-6)
831-832	(Membrane Technology for Gas Separation)	3((3)-0-6)
831-833	(Smart Materials and Applications)	3((3)-0-6)
831-834	(Biotechnology Innovation)	3((3)-0-6)
831-835	(Biotechnology for Energy and Environment)	3((3)-0-6)
831-836	(Bio-fuel Technology)	3((3)-0-6)

Elective course Type 4: Environment and Energy

831-841	(Design for Energy and Environment)	3((3)-0-6)
831-842	(Energy Conservation and Management)	3((3)-0-6)
831-843	(Safety and Occupational Health in Energy Activity)	3((3)-0-6)
831-844	(Environmental Impact Assessment for Power Plant)	3((3)-0-6)
831-845	(Law for Environmental Management)	3((3)-0-6)

Elective course Type 5: Energy and Society

831-851	(Energy in Community)	3((3)-0-6)
831-852	(Public Participation in Energy Business)	3((3)-0-6)
831-853	(Awareness in Energy Saving)	3((3)-0-6)
831-854	(Corporate Social Responsibility from Energy Sector)	3((3)-0-6)
831-855	(Personnel Management in Energy Business)	3((3)-0-6)

Specialization Elective course

831-890	(Special Topics in Energy and Environment)	3(3-0-6)

Thesis

831-900	(Thesis)	18(0-54-0)
831-901	(Thesis)	36(0-108-0)
831-902	(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.

3.1.5.2 The meaning of numeral code of credit
[Example. 3(2-3-4)] are as follows:

First number (3) represents the total credits
Second number (2) represents hours of lecture per week
Third number (3) represents hours of practice per week
Fourth number (4) represents hours of independent study per week

3.1.6 Study Plan for Master of Science Program

Plan A; A1 Thesis 36 credits

First Year, Semester 1

831–801 (Environmental Research Methodology) *(No-credit)	3 credits
831-804 (Seminar in Sustainable Energy Management I) *(No-credit)	1 credits
831-901 Thesis	9 credits

First Year, Semester 2

831-805 (Seminar in Sustainable Energy Management II) *(No-credit)	1 credits
831-901 Thesis	9 credits

Second Year, Semester 1

831-901 Thesis	9 credits

Second Year, Semester 2

831-901 Thesis	9 credits
Total credits	**36 credits**

Plan A; A 2 Study 18 credits, Thesis 18 credits

First Year, Semester 1

831–801 (Environmental Research Methodology)		3 credits
831-804 (Seminar in Sustainable Energy Management I) (*No-credit)		1 credits
831-802 (Basics of Energy Systems)		3 credits
831-803 (Sustainable Energy Systems)		3credits
	Total	**9 credits**

First Year, Semester 2

831-805 (Seminar in Sustainable Energy Management II) (*No-credit)		1 credits
xxx - xxx	Elective course	3 credits
xxx - xxx	Elective course	3 credits
xxx - xxx	Elective course	3 credits
	Total	**9 credits**

Second Year, Semester 1

831-900 Thesis	9 credits

Second Year, Semester 2

831-900 Thesis	9 credits
Total credits	**36 credits**

3.1.7 Study Plan for Doctor of Philosophy Program

Plan 1.1 Thesis 48 credits

First Year, Semester 1

831-804 (Seminar in Sustainable Energy Management I) (*No-credit)	1 credits
831-902 Thesis	8 credits

First Year, Semester 2

831-805 (Seminar in Sustainable Energy Management II) (*No-credit)	1 credits
831-902 Thesis	8 credits

Second Year, Semester 1

831-902 Thesis	8 credits

Second Year, Semester 2

831-902 Thesis	8 credits

Third Year, Semester 1

831-902 Thesis	8 credits

Third Year, Semester 2

831-902 Thesis	8 credits
Total credits	**48 credits**

3.1.8 Course Descriptions

Compulsory courses 9 credits

831-801 (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

831-802 (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

831-803 (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

831-804 (Seminar in Sustainable Energy Management I)** 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, opinion exchange including the ability to present by the students

831-805 (Seminar in Sustainable Energy Management II)** 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, opinion exchange including the ability to present by the students

Elective courses

Elective course Type 1 (Energy Science and Resources)

831-811 (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

831-812 (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

831-813 (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

831-814 (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

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

831-821 (Technology Management) 3(3-0-6)

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

831-822(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

831-823 (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

831-824 (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

831-825 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)

831-831 (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.

831-832 (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

831-833 (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.

831-834 (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

831-835 (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

Elective course Type 4 (Environment and Energy)

831-841 (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

831-842 (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

831-843 (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

831-844 (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

831-845 (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

Elective course Type 5 (Energy and Society)

831-851 (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

831-852 (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

831-853 (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

831-854 (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

831-855 (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

831-890 (Special Topics in Energy and Environment) 3(3-0-6)

Current interests concerning natural resources and environment

Thesis

831-900 (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

831-901 (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

831-902 (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