WASHINGTON STATE UNIVERSITY
VANCOUVER
World Class. Face to Face.

School of Engineering and Computer Science

ECE 311: Introduction to Power and Energy Systems
Master Syllabus

Catalog Data:	**ECE 311: Introduction to Power and Energy Systems**; 3 credits This course introduces structures and configurations of a power system for power generation, transmission, and distribution; covers basic concepts of single-phase and three-phase systems, and per unit system; presents major power system components (power transformers, generators, transmission lines, and loads) and their representations/models for system analysis. It also introduces the analysis and design of conventional and alternative energy sources.
Class Schedule:	Three lecture hours per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	ECE 321
Prerequisites by Topic:	1. Knowledge of basic circuit theory including DC circuits and transient response. 2. Knowledge of phasors and steady-state circuit analysis.
Typical Text:	Power System Analysis and Design, 7th Edition, J. Duncan Glover, Mulukutla S. Sarma, Thomas Jeffrey Overbye, and Adam B. Birchfield, 2022, ISBN 13: 978-0357676189
Course Coordinator:	Dr. Hang Gao
Course Objectives:	Students will: 1. Gain a basic knowledge of the history of electric energy systems 2. Obtain knowledge on fundamentals of power systems including phasors, network equations, single-phase and three-phase systems, and per unit system 3. Understand the general advantages and disadvantages of various electrical energy sources including environmental impacts of each source 4. Learn how to use the System Advisor Model (SAM) for techno-economic analysis of energy systems 5. Understand power transformer principles and representations in power systems 6. Calculate transmission line parameters and understand transmission line operations
Topics Covered:	1. History of power systems 2. Single-phase AC circuits and power 3. Three-phase systems 4. Energy resources, power plants, and environmental impacts 5. Renewable energy 6. Power transformers 7. Per-unit system 8. Transmission line parameters 9. Steady-state operation of transmission lines 10. Power distribution systems 11. Emerging topics in power and energy systems
Lab Experiments and Activities:	n/a

Course Outcomes:	Students will be able to:			
	Assessed for Program Outcomes	1.c. Use appropriate power system models to formulate solutions. 1.d. Apply circuit theory to solve power system problems. 2.c. Analyze power systems with safety, social, environmental, and economic factors and constraints. 2.d. Produce solutions that meet specified needs for engineering designs considering risks and trade-offs.		
	Other	2.a. Define engineering problems from specified needs for power systems. 4.a. Evaluate power systems solutions considering the global, economic, environmental, and societal impacts.		
Relationship of Course to Program:		Meets: Educational Objectives 1, 2, 3, 7 Program Outcomes 1, 2, 4		
Prepared by:		Dr. Josue Campos do Prado	Date:	Apr. 20, 2022
Approved by CAC:				