



**Tafila Technical
University**

جامعة الطفيلة التقنية

College of Engineering

كلية الهندسة

**Department of Electrical Power
Engineering & Mechatronics**

**قسم هندسة القوى الكهربائية
والميكاترونكس**

**MSc of Electrical Power &
Control Engineering**

**ماجستير هندسة القوى الكهربائية
والتحكم**

2013

Study Plan
Thesis Track: 33 Credit
Hours

الخطة الدراسية
مسار الرسالة: 33 ساعة معتمدة

Compulsory Courses: 15 Credit Hours

المساقات الإلزامية: 15 ساعة معتمدة

الساعات المعتمدة/نظرية Credit hours	Course / المساق		رقم المساق
	English	العربية	Course number
3	Modern Control Systems	أنظمة التحكم الحديثة	0102861
3	Electrical Machines	الألات الكهربائية	0102821
3	Computational Methods in Power Engineering	الطرق الحاسوبية في هندسة القوى	0102842
3	Modelling & Simulation in Power Systems	النمذجة والمحاكاة في أنظمة القوى	0102871
3	Renewable Energy	الطاقة المتجددة	0102872

Elective Courses: 9 Credit Hours

المساقات الاختيارية: 9 ساعات معتمدة

الساعات المعتمدة/نظرية Credit hours	Course / المساق		رقم المساق
	English	العربية	Course number
3	Nonlinear Systems	الأنظمة غير الخطية	0102863
3	Power System Operation & Control	التشغيل والتحكم في أنظمة القوى	0102875
3	Fuzzy Control	التحكم الضبابي	0102864
3	Optimal Control	التحكم الأمثل	0102862
3	High Voltage	الجهد العالي	0102876
3	Digital Control Design & Analysis	تصميم وتحليل التحكم الرقمي	0102865
3	Power Plants	محطات القوى	0102877
3	Power System Stability	استقرارية أنظمة القوى	0102873
3	Numerical Methods	طرق عددية	0102841
3	Power Electronics & Drives	الالكترونيات القدرة والقيادة	0102866
3	Power System Planning & Distribution	تخطيط أنظمة القوى والتوزيع	0102874
3	Special Topics in Electrical Power & Control Engineering	موضوعات خاصة في هندسة القوى الكهربائية والتحكم	0102800

Thesis: 9 Credit Hours:

الرسالة (0102899) : 9 ساعات معتمدة:

Study Plan
Comprehensive-Exam Track:
33 Credit Hours

الخطة الدراسية
مسار الامتحان الشامل:
33 ساعة معتمدة

Compulsory Courses: 24 Credit Hours

المساقات الإلزامية: 24 ساعة معتمدة

الساعات المعتمدة/نظرية Credit hours	المساق / Course		رقم المساق
	English	العربية	Course number
3	Modern Control Systems	أنظمة التحكم الحديثة	0102861
3	Electrical Machines	الآلات الكهربائية	0102821
3	Computational Methods in Power Engineering	الطرق الحاسوبية في هندسة القوى	0102842
3	Modelling & Simulation in Power Systems	النمذجة والمحاكاة في أنظمة القوى	0102871
3	Renewable Energy	الطاقة المتجددة	0102872
3	Power System Stability	استقرار أنظمة القوى	0102873
3	Power System Planning & Distribution	تخطيط أنظمة القوى والتوزيع	0102874
3	Optimal Control	التحكم الأمثل	0102862

Elective Courses: 9 Credit Hours

المساقات الاختيارية: 9 ساعات معتمدة

الساعات المعتمدة/نظرية Credit hours	المساق / Course		رقم المساق
	English	العربية	Course number
3	Nonlinear Systems	الأنظمة غير الخطية	0102863
3	Power System Operation & Control	التشغيل والتحكم في أنظمة القوى	0102875
3	Fuzzy Control	التحكم الضبابي	0102864
3	High Voltage	الجهد العالي	0102876
3	Digital Control Design & Analysis	تصميم وتحليل التحكم الرقمي	0102865
3	Power Plants	محطات القوى	0102877
3	Numerical Methods	طرق عددية	0102841
3	Power Electronics & Drives	الالكترونيات القدرة والقيادة	0102866
3	Special Topics in Electrical Power & Control Engineering	موضوعات خاصة في هندسة القوى الكهربائية والتحكم	0102800

0102898: Comprehensive Exam: 0 credit hours

الامتحان الشامل (0102898): 0 ساعة معتمدة

0102863: Nonlinear Systems:

This course includes Nonlinear dynamics, fixed Points and Stability, Bifurcations in one dimension, the phase plane - linear systems, limit cycles, analyzing chaotic systems, Fractal Dimension, Poincare Maps, Lyapunov Exponents.

0102875: Power System Operation and Control:

A course dealing with modern power system operational and control problems and solution techniques. State estimation, contingency analysis, load-frequency control, and automatic generation control. Load flow analysis and external equivalents for steady-state operations.

0102821: Electrical Machines:

This course includes Generalized theorem of electrical machines, structure, and principle of operation, modelling and application of DC machines, Synchronous Machines, Induction Machines, Switched-reluctance motors, brushless dc motors and step motors.

0102861: Modern Control Systems:

This course includes Linear algebra and matrices, state variable analysis, eigenvalues and the Eigen vectors principles, observe-ability, controllability and stability of linear systems, stability of non-linear systems using Lyapunov theorems, design of feedback control systems, introduction to optimal control theory.

0102842: Computational Methods in Power Engineering:

This course introduces various linear and nonlinear program deterministic and heuristic based optimization algorithms that are specially suited for the design, analysis and operation of electric power systems, machines, and transformers.

0102864: Fuzzy Control:

This course includes Fuzzy set theory, Fuzzy logic and approximate reasoning, linguistic approach and linguistic approximation, Pattern Recognition and Cluster Analysis, Fuzzy control, Fuzzy controller applications in power engineering.

0102862: Optimal Control:

This course includes Calculus of variation, minimum principle, dynamic programming. Both discrete time systems and continuous times are addressed. Particular consideration is given to application to multivariable linear time invariant systems in terms of H_2 and H_∞ optimal control.

0102871: Modelling and Simulation in Power Systems:

This course includes Understanding and modelling the power system apparatuses for normal and transient studies such as: synchronous generator, transmission lines and cables, transformer and loads.

0102876: High Voltage:

This course includes Generation of high voltages, methods of measuring high ac, dc impulse voltages, partial discharges, measurement methods of capacitance and dielectrically materials, optical methods and application of high voltage engineering.

0102865: Digital Control Analysis and Design:

This course includes Analysis of Sampled-Data Models, Translation of Analogy Design, Digital PID Controllers, Direct Digital Design for regulating and tracking, Digital Control of Nonlinear Systems, Numerical Methods for Solving Systems of Equations, Controllers and Observers from Newton's Method.

0102877: Power Plants:

This course includes Generation of electric power using fossil, nuclear and renewable, including solar, geothermal, wind, hydroelectric, biomass and ocean, energy sources. Power plant thermal cycle analysis. Cogeneration and combined cycles. Economics, operations, and design of electric power stations. Energy storage.

0102873: Power System Stability:

This course includes Synchronous machine modeling and parameters, excitation systems, automatic voltage regulators, power system stabilizers, power system loads, prime movers, small-signal stability, transient stability, voltage stability, methods of improving stability, system studies.

0102841: Numerical Methods:

This course includes Error analysis of numerical method, interpolation and approximation polynomial interpolation; Lagrange, Nevil, Newton and Hermite methods, spline and Bspline interpolation, Numerical differentiation and integration, Numerical solution of nonlinear equations, Roots of polynomials, Zero and minimum points, High order methods.

0102872: Renewable Energy:

This course includes Power challenge, solar cell energy, wind energy, nuclear energy geothermal energy, and ocean energy. Interfacing renewable energy to existing grid-connected power; detailed consideration of photovoltaic inverter battery systems; design aspects of renewable electrical energy systems

0102866: Power Electronics and Drives:

This course includes Advances in power electronics devices such as GTOs, Insulated gate bipolar power transistor (IGBT), and Mosfet Controlled Thyristors MCTS and their applications in power conversion systems. System considerations, power electronic drive systems, performance of machines driven by power electronic converters and effect on machine ratings. The industrial drives and their classification. Dynamics analysis and performance characteristics of AC and DC drives. Direct and Indirect Vector controlled Drives.

0102874: Power System Planning and Distribution:

This course includes study of generation planning, bulk power supply systems, production costing analysis, and load forecasting. Dispersed generation. Electric power system reliability and stability

0102800: Special Topics in Electrical Power & Control Engineering:

New trends in the field to be determined by the instructor.