

مواد الكورس الاول (الماجستير)

١. ADVANCED CONTROL SYSTEM

أنظمة سيطرة متقدمة

عدد الوحدات: ٢

مفردات المادة:

State variables of Linear Systems, controllability and observability. PID Control, State Feedback Control, Observer, State Estimation, State Estimator Design, Optimal Control of linear systems Linear Quadratic Gaussian (LQG) Control. Uncertainty and Robustness. Structured and Unstructured uncertainty. nonlinear systems, Linearization, nonlinear Control.

٢. ADVANCED MATHEMATICS

الرياضيات المتقدمة

عدد الوحدات: ٢

مفردات المادة:

Complex Number, Complex Functions, Complex Integral, Conformal Mappings, Ordinary Differential Equations of the First and Second Degree, Matrices and Determinates, Laplace Transformation and Inverse, Fourier Series, Power Series, Theorems ,Integrals, Boundary value problem.

٣. ADVANCED ROBOTICS

انسان الي متقدم

عدد الوحدات: ٢

مفردات المادة:

Introduction to Robotics, Rigid motion and transformation , Forward kinematics and inverse kinematics, Path and Trajectory. Velocity Kinematics, Dynamics of robot, Equation of Motion. Independent Joint control, Actuator Dynamics.

٤. INDUSTRIAL AUTOMATION

الأتمة الصناعية

عدد الوحدات: ٢

مفردات المادة:

Principles of industrial automation systems. System approach for automated machinery and plants. Advanced topics in pneumatic and hydraulic components and systems. Design of pneumatic and hydraulic systems. Programmable logic controllers (PLCs). Principles of industrial robots and their role in industrial automation. Mobile robots. Robots arms. Parallel Robotic. Automated Storage & Retrieval Systems (AS/RS). Case study. Term project.

٥. PATTERN RECOGNITION AND MACHINE LEARNING

تمييز الأنماط وتعلم الآلة

عدد الوحدات: ٢

مفردات المادة:

Introduction, Machine Perception, Pattern Recognition Systems, Sensing, Segmentation and Grouping, Feature Extraction, Classification, Post Processing, Training, Evaluation, Learning and Adaptation. Bayesian Decision theory, Classification, Minimum-Error-Rate

Classification, Minimax Criterion, Neyman-Pearson Criterion, Classifiers, Gaussian Data, Error Probabilities and Integrals, Error Bounds for Normal Densities. Discriminant Functions, Gaussian Classifiers, Decision Regions for Two-Dimensional. Threshold Decoding, Maximum Likelihood Decoding, Receiver Operating Characteristics. Maximum Likelihood Estimation, Bias, Convergence. Maximum Likelihood and Bayesian Estimation, Bayesian Parameter Estimation and Learning. Advanced Discriminant Analysis, Perceptron Learning, Minimum Squared Error (MSE), Least-Mean Squares (LMS) rule, The k Nearest Neighbors classification rule, Principal Components Analysis (PCA). Expectation Maximization Algorithm, Linear Algebra, Linear Discriminant Analysis (LDA), Principal Component Analysis (PCA), Face Recognition. Introduction to Support Vector Machines (SVMS). Introduction to Neural Networks, Multilayer Neural Networks, Inspiration from Biology, History, Perceptron, Multilayer perceptron. Backpropagation, Regularization. Introduction to Deep Learning. Training Deep Networks. Auto encoders and Convolutional Neural Networks. Alternate Optimizers and Training Strategies

SMART MATERIALS AND APPLICATION .٦

المواد الذكية وتطبيقاتها

عدد الوحدات: ٢

مفردات المادة:

A review on the conventional engineering materials and their classification, Introduction to composite materials, Definition of Smart materials, their properties and distribution by type, The development of smart materials and structures, Areas of application in intelligent systems, Piezoelectric materials, Shape memory alloys, Magnetostrictive materials, Electrorheological materials, Magnetorheological fluids, Fiber Optic Sensors.

ENGLISH LANGUAGE I .٧

اللغة الانكليزية 1

عدد الوحدات: 1

مفردات المادة:

مواد الكورس الثاني (الماجستير)

١. ADVANCED NUMERICAL AND STATISTICAL

الإحصاء والتحليلات العددية المتقدمة

عدد الوحدات: ٢

مفردات المادة:

Numerical Integration, Numerical methods for differential equations, Polynomial approximations of functions, Elements of the interpolation theory, Numerical Solution of Non-Linear Equation.

٢. ADVANCED DYNAMICS AND VIBRATION

الاهتزازات والديناميك المتقدم

عدد الوحدات: ٢

مفردات المادة:

Equation of motion for non-linear systems, Flexibility and stiffness influence coefficients, Properties of the stiffness and mass coefficients, Lagrange's equations, Linear transformation: coupling. Undamped free vibration: the differential eigenvalue problem. Orthogonality of modal vectors. Response to harmonic external excitations. Relation between discrete and distributed systems. Bending vibration of beam. Transformation matrix

٣. RENEWABLE ENERGIES

طاقات متجددة

عدد الوحدات: ٢

مفردات المادة:

Energy resources: status prospects and sustainability issues, the origin of renewable energy flows, individual renewable energy resources. Technologies for converting and handling renewable energy: general principles, heat energy conversion process, mechanical energy conversion process, solar radiation conversion process, electromechanical energy conversion process, bioenergy conversion process, energy transmission, energy storage technology. Planning: energy system planning, integrated approaches.

٤. EMBEDDED SYSTEM

الانظمة المدمجة

عدد الوحدات: ٢

مفردات المادة:

System, Embedded System, Characteristics of an Embedded System, Embedded System Advantages & Disadvantages, Types of Embedded System, Basic Structure of an Embedded System, Embedded system hardware, Embedded system firmware and software, Embedded systems vs. VLSI, Processors in a System, Types of Processors, Microprocessor, Microcontroller, Microprocessor vs Microcontroller, Embedded Systems -Architecture Types, CISC vs RISC, Embedded Systems -Tools, Debugging Tools in an Embedded System, Criteria for Choosing Microcontroller, Microcontroller versus general-purpose microprocessor, A brief history of the PIC microcontroller, PIC

microcontroller program ROM, PIC18Fxxx with flash, OTP version of the PIC, Masked version of PIC, PIC microcontroller data RAM and EEPROM, PIC microcontroller I/O pins, PIC microcontroller peripherals, The WREG register in the pic, pic status register, PIC data type, Assembler directives, Rules for labels in Assembly language, Structure of Assembly language, How to Increase the Processor Power, Pipelining, I/O PORT PROGRAMMING IN PIC18, arithmetic instructions, logic and compare instructions, MPLAB programming.

٥. ROBOTICS VISION AND TECHNOLOGY

تكنولوجيا رؤية الانسان الآلي

عدد الوحدات: ٢

مفردات المادة:

Introduction to Vision Applications, Basics of Images, Convolutions and Filtering, Filtering and Edges, Laplacian Operations and Edges, Canny Edge Detection, Finding Features (introduction to feature engineering, corner detection), Scale Invariant Feature Transform (SIFT), Optical Flow I, Optical Flow II, Motion Models and Object Tracking, Image Segmentation (Basic), Mean Shift Clustering, Neural Nets for Computer Vision I, Neural Nets for Computer Vision II (Deep), Graph Algorithms for Vision Applications.

٦. ADVANCED MODELING AND SIMULATION

النمذجة والمحاكاة المتقدمة

عدد الوحدات: ٢

مفردات المادة:

State variable Modelling of Continuous Dynamic Systems. Solution methods for Nonlinear Differential equations. Multiport Systems, system Model Development Electrical Systems, Mechanical Systems, Hydraulic and Acoustic Circuits, Transducers, Bond Graph Technique, Sensitivity analysis Nonlinear System Simulation Black-Box Identification, system identification and optimization techniques, validation of dynamic models, Qualitative Modelling.

٧. TEACHING PUBLICATIONS AND PRESENTATION

تعليم اعداد ونشر البحوث

عدد الوحدات: 2

مفردات المادة:

Introduction to the publication and presentation course, How to get free open access papers for your research, How to search effectively from the web ?, Writing attractive Title and Abstract of your research, summary and rewriting using citations, The structure and contents of the scientific paper, Structure of MSc thesis, Important points when witting your MSc thesis, Tips and notes for thesis writing- Part 2, Mendeley program for reference management, Optional: Making Effective presentation (Preparing slides and how to present them), Closing the course and Six hats thinking model.

٨. ENGLISH LANGUAGE II

اللغة الانكليزية 2

عدد الوحدات: 1

مفردات المادة: