**جمهورية العراق**
**وزارة التعليم العالي والبحث العلمي/ جامعة الامام جعفر الصادق(ع)**
**كلية تكنولوجيا المعلومات/ قسم هندسة الحاسوب**
**المرحلة الرابعة :-**

| اسم المادة | | عدد الساعات في الاسبوع | | | |
|---|---|---|---|---|---|
| باللغة العربية | باللغة الانكليزية | نظري | عملي | مجموع | عدد الوحدات |
| الحوسبة المرنة | Soft Computing | 2 | 2 | 4 | 6 |

| Week | Topics Covered | Notes |
|---|---|---|
| 1. | Introduction of soft computing<br>- Soft Computing vs. hard computing<br>- Various types of soft computing techniques<br>- Application of soft computing | |
| 2. | - Neural Network :<br>-Biological neuron<br>- Artificial neuron, definition of ANN<br>- Taxonomy of neuron net<br>- Difference between ANN and human brain | |
| 3. | - Neural Network :<br>- Characteristics and application of ANN<br>- Single layer network<br>- Perceptron training algorithm<br>- Linear separability<br>- Learning rules/ Delta rules, ADALINE, MADALINE ,IA v/s ANN. | |
| 4. | fixed –weight competitive nets<br>-kohonen self –organizing MAPS (SOM) | |
| 5. | - Introduction of Multi- Layer Perceptron (MLP)<br>- Difference activation functions<br>- Error back propagation algorithm<br>- derivation of BBPA, momentum, limitation<br>- Characteristics and application of BBPA | |
| 6. | -Counter propagation network<br>- Architecture, functioning & Characteristics of counter<br>- propagation network<br>- Hopfield/ Recurrent network | |
| 7. | -Counter propagation network<br>- Configuration ,stability constraints<br>- Associative memory, and Characteristics limitation and applications. | |

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|---|---|---|
| **8.** | **-Radial basis functions**<br>**- Adaptive Resonance Theor**<br>**- Architecture, Classifications**<br>**- Implementation and training.** | |
| **9.** | **-Fuzzy Logic:**<br>**- Fuzzy set theory, Fuzzy set versus crisp set**<br>**- Crisp relation & fuzzy relation** | |
| **10.** | **- Fuzzy systems:**<br>**- crisp logic, fuzzy logic, introduction & features of membership functions**<br>**-Fuzzy rule base system**<br>**- Fuzzy propositions, formation** | |
| **11.** | **Membership function …….**<br>**-Truth tables and linguistic approximation**<br>**-Fuzzy relation on sets**<br>**-Composition of fuzzy relation**<br>**-Representation of fuzzy rule**<br>**1-Process of fuzzy control ……** | |
| **12.** | **- Fuzzy systems:**<br>**- decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems**<br>**- Fuzzy decision making & Applications of fuzzy logic.** | |
| **13.** | **- Genetic algorithm:**<br>**- Fundamentals, basic concepts**<br>**- Working principle, encoding, fitness function, reproduction** | |
| **14.** | **- Genetic algorithm:**<br>**- Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator**<br>**-Generational Cycle, Convergence of GA** | |
| **15.** | **- Genetic algorithm:**<br>**- Applications & advance in GA**<br>**- Differences & similarities between GA & other traditional method** | |
| **16.** | **- Hybrid systems:**<br>**- Fuzzy Back Propagation Networks**<br>**- Integration of Neural Networks** | |
| **17.** | **- Hybrid systems:**<br>**- Fuzzy logic and Genetic Algorithm**<br>**- GA Based Back Propagation Networks** | |