# *Program Specification of*

**Master of Science in Computers and Systems Engineering**

University**: Zagazig** Faculty**: Engineering**

**A - Basic Information**

1. **Program title:** Master of Science in Computers and Systems Engineering
2. **Program type:** Single √ Double Multiple Aa
3. **Faculty:** Engineering
4. **Department responsible for the program:** Computers and Systems Engineering
5. **Coordinator(s):** Dr. Hazem Shehata
6. **External evaluator(s):** Prof. Dr. Ali Ali Fahmi
7. **Last date of program specifications approval: / /**

**B - Specialized Information**

**1- Program Attributes:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| By the end of the Master of Science program the students will be able to:

|  |  |
| --- | --- |
| 1. | Follow the basic methodologies of scientific research and use its tools.  |
| 2. | Apply the analytical methodology in computer and system engineering.  |
| 3. | Combine computer and systems engineering knowledge with any other relevant knowledge, and apply in the professional career. |
| 4. | Show awareness of the current problems and the new visions in the field of computers and systems engineering.  |
| 5. | Identify problems in computers and digital systems and find suitable solutions to these problems.  |
| 6. | Use many computer and systems engineering skills in practice. |
| 7. | Communicate with others effectively and become team leaders. |
| 8. | Make informed decisions in different professional situations. |
| 9. | Use the available resources effectively. |
| 10. | Recognize their role in developing the society and preserving the environment in the light of the international and regional changes. |
| 11.  | Behave ethically and professionally as computer and systems engineers. |
| 12. | Keep on learning and self developing academically and professionally.  |

 |

**2- Intended learning outcomes (ILO’s):**

**a- Knowledge and understanding:**

The graduates of the Master of Science program should have ability to:

|  |  |
| --- | --- |
| a1. | Recognize the foundations of computer and systems engineering. |
| a2. | Relate the different aspects of software engineering.  |
| a3. | Identify the main applications of machine intelligence. |
| a4. | Explain the operation of control systems. |
| a5. | Describe the main layers and protocols of computer networks  |
| a6. | Realize the impact of computer and systems engineering on the society and the environment. |
| a7. | Follow up the scientific progress in computers and systems engineering. |
| a8. | Recognize the ethical and legal obligations of computer and systems engineering. |

**b- Intellectual Skills:**

The graduates of the Master of Science program should be able to:

|  |  |
| --- | --- |
| b1. | Analyze and interpret data related to computer and systems engineering.  |
| b2. | Find solutions to computer and systems engineering problems with limited information. |
| b3. | Combine different types of knowledge to solve computer and systems engineering problems. |
| b4. | Conduct a valid research study in computer and systems engineering.  |
| b5. | Manage risks expected in computer and systems engineering. |

**c- Professional and practical skills:**

The graduates of the Master of Science program should have ability to:

|  |  |
| --- | --- |
| c1. | Apply computer and systems engineering skills practically. |
| c2. | Write and evaluate technical reports. |
| c3. | Compare and evaluate methods and tools used in computer and systems engineering. |

**d- General and transferable skills:**

The graduates of the Master of Science program should be able to:

|  |  |
| --- | --- |
| d1. | Communicate effectively with others. |
| d2. | Leverage information technology to enhance professional practices. |
| d3. | Evaluate their educational needs and practice self-learning.  |
| d4. | Suggest criteria for evaluating others.  |
| d5. | Manage time effectively. |
| d6. | Work in a team as leaders or members. |

**3-Academic standards**

**3a External references for standards (benchmarks):**

This program fulfills the Academic Reference Standards (ARS) guidelines of March 2009 for postgraduate programs prepared by the Supreme Council of Universities in Egypt.

**4- Curriculum Structure and Contents:**

**4.a- Program duration:** four academic semesters

(24 credit hours for courses + 18 credit hours for thesis)

**4.b- Program structure: (**Please refer to table (a) below)

**Table (a) Master of Science program structure**

|  |  |  |
| --- | --- | --- |
| **Stage** | **Credit hours** | **Courses available to choose from (each course weights 3 credit hours)** |
|
| **Preparatory** | 9 |  **ENG 5XX level (see table (b))** |
| **Second**  | 15 |  **CSE 6XX level (see table (b))** |
| **Thesis**  | 18 | **Research work and thesis writing** |

**5- Program courses**

**Table (b) Courses available in the Master of Science program**

|  |  |  |
| --- | --- | --- |
| **ILO's** | **Course** | **Code** |
| **General** | **Practical** | **Intellectual** | **Knowledge & Understanding** |
| **d1 - d6** | **c3** | **b1, b2** | **a1** | **Advanced Engineering Mathematics** | **ENG 501** |
| **d1 - d6** | **c3** | **b1, b2** | **a1** | **Engineering Computational Methods**  | **ENG 502** |
| **d1 - d6** | **c1, c3** | **b1, b2** | **a1, a6** | **Engineering Experimental Methods** | **ENG 503** |
| **d1 - d6** | **c1, c3** | **b1 - b3, b5** | **a1** | **Engineering systems Design and Analysis**  | **ENG 504** |
| **d1 - d6** | **c1, c3** | **b1, b2** | **a1, a2, a7** | **Advanced Programming** | **ENG 505** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a5 - a8** | **Information Theory** | **CSE 601** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a2** | **Queuing Theory** | **CSE 602** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a5, a7** | **Computer Communication Networks** | **CSE 603** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a7** | **Pattern Recognition** | **CSE 604** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a7** | **Image Processing** | **CSE 605** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a7** | **Digital Electronic Circuits**  | **CSE 606** |
| **d1 - d6** | **c2, c3** | **b1- b3** | **a1, a2, a7** | **Computer Aided Design** | **CSE 607** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a7** | **Microprocessor and its Applications** | **CSE 608** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a2, a7** | **Advanced Operating Systems** | **CSE 609** |
| **d1 - d6** | **c1 - c3** | **b1, b2** | **a1, a2, a7** | **Database Systems** | **CSE 610**  |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a2, a7** | **Parallel and Distributed Processing** | **CSE 611**  |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a5, a7** | **Computer Networks** | **CSE 612**  |
| **d1 - d6** | **c1 - c3** | **b1, b2, b5** | **a1, a3, a6, a7** | **Artificial Intelligence** | **CSE 613**  |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a3, a6, a7** | **Expert Systems** | **CSE 614**  |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **Optimal Control** | **CSE 615**  |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **Nonlinear Control**  | **CSE 616** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4, a6, a7** | **Computer Control** | **CSE 617** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a7** | **Large Scale Systems** | **CSE 618** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a4** | **Estimation and Observation in Control Systems** | **CSE 619** |
| **d1 - d6** | **c1 - c3** | **b1 - b5** | **a1 - a8** | **Selective Topics** | **CSE 620** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a7** | **Neural Networks** | **CSE 621** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **Stochastic Control Systems**  | **CSE 622** |
| **d1 - d6** | **c1 - c3** | **b1 - b3, b5** | **a1, a4** | **Systems Design and analysis** | **CSE 623** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1** | **Automata theory** | **CSE 624** |
| **d1 - d6** | **c1 - c3** | **b1, b2, b5** | **a1, a2, a6, a7** | **Software Engineering** | **CSE 625** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a6, a7** | **Remote Sensing** | **CSE 626** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a7** | **Faults Diagnosis Technology** | **CSE 627** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a6 - a8** | **Geographic Information Systems**  | **CSE 628** |
| **d1 - d6** | **c1 - c3** | **b1, b2** | **a1, a3, a4, a7** | **Robotics** | **CSE 629** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a2** | **Data Structure and Algorithms** | **CSE 630** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **System Identification** | **CSE 631** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **Adaptive Control** | **CSE 632** |
| **d1 - d6** | **c2, c3** | **b1, b2, b5** | **a1, a5 - a8** | **Computer Networks Security** | **CSE 633** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a5 - a7** | **Wireless Networks** | **CSE 634** |
| **d1 - d6** | **c1 - c3** | **b1, b2** | **a1** | **Simulation and Modeling**  | **CSE 635** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a4, a7** | **Intelligent Control** | **CSE 636** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a7** | **Genetic Algorithms** | **CSE 637** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a6 - a8** | **Satellite Navigation Systems** | **CSE 638** |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a4** | **Guidance and Control Systems** | **CSE 639**  |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a6 - a8** | **Satellite Communication Systems** | **CSE 640**  |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a6 - a8** | **Global Positioning Systems (GPS)** | **CSE 641** |
| **d1 - d6** | **c1 - c3** | **b1 - b5** | **a4, a6 - a8** | **Advanced Topics in Control** | **CSE 642** |
| **d1 - d6** | **c1 - c3** | **b1 - b5** | **a2, a3, a5 - a8** | **Advanced Topics in Computers** | **CSE 643**  |
| **d1 - d6** | **c2, c3** | **b1, b2** | **a1, a3, a7** | **Neuro-Fuzzy Systems** | **CSE 644** |

**6- Program admission requirements**

The applicant to the Master of Science program must hold a B.Sc. in Engineering with a minimum grade of "Good" (which is equivalent to cumulative grade of 65%) from a recognized university in Egypt or an equivalent degree recognized by the supreme council of universities. Applicants form fields other than engineering may be admitted upon a decision from the Faculty council.

**7- Regulations for progression and program completion First Year/ Level/ Semester**

The student must pass all the courses with at least C grade in each course.

|  |  |  |
| --- | --- | --- |
| **%** | **Points** | **Grade** |
| more than 90% | 4.0 | **A** |
| from 88 to less than 90% | 3.7 |  **A-** |
| from 85 to less than 88% | 3.3 |  **B+** |
| from 80 to less than 85% | 3.0 |  **B** |
| from 78 to less than 80% | 2.7 | **B-** |
| from 75 to less than 78% | 2.3 |  **C+** |
| from 70 to less than 75% | 2.0 | **C** |
| from 68 to less than 70% | 1.7 |  **C-** |
| from 65 to less than 68% | 1.3 |  **D+** |
| from 60 to less than 65% | 1.0 | **D** |
| less than 60% | 0.0 | **F** |

**8- Methods and rules of evaluating students attending the Program**

|  |  |
| --- | --- |
| **Target ILO’s Evaluated** | **Method** |
| **General & Transferable skills** | **Professional & Practical Skills** | **Intellectual skills** | **Knowledge & Understanding Skills** |
| **√** | **√** | **√** | **√** | Assignments, quizzes, technical reports |
| **√** | **√** |  | **√** | Presentations |
|  |  | **√** | **√** | Final exams (written) |

**9- Evaluation of Program Intended Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **Sample** | **Tool** | **Evaluator** |
| **50%** | Meeting Questionnaire | Senior students |
| **5%** | Meeting Questionnaire | Alumni |
| **5** | Meeting Report | Stakeholders (Employers) |
| **2** | Report | External evaluator(s) (External Examiner(s)) |
|  | **NA** | Other |

**Program coordinator:**

**Name:** Dr. Hazem Shehata

**Signature:**

**Acting Department Head: Associate Prof. Dr. Nesreen Ibrahim Ziedan**

**Signature:**

**Date: /**

**ANNEX 1:**

**The ILO’s (of the Master of Science in Computers and Systems Engineering Program) – Course (main ILO’s) matrix.**

|  |  |
| --- | --- |
| **Program ILOs** | **Course** |
| **(d)****General** **& Transferable****Skills** | **(c) Professional****& Practical Skills** | **(b)****Intellectual****Skills** | **(a)****Knowledge****& Understanding** | **Course****Name** | **Course****Code** |
| **d6** | **d5** | **d4** | **d3** | **d2** | **d1** | **c3** | **c2** | **c1** | **b5** | **b4** | **b3** | **b2** | **b1** | **a8** | **a7** | **a6** | **a5** | **a4** | **a3** | **a2** | **a1** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  |  | **•** | **•** |  |  |  |  |  |  |  | **•** | **Advanced Engineering Mathematics** | **ENG 501** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  |  | **•** | **•** |  |  |  |  |  |  |  | **•** | **Engineering Computational Methods** | **ENG 502** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  |  | **•** | **•** |  |  | **•** |  |  |  |  | **•** | **Engineering Experimental Methods** | **ENG 503** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** | **•** |  | **•** | **•** | **•** |  |  |  |  |  |  |  | **•** | **Engineering systems Design and Analysis**  | **ENG 504** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  |  | **•** | **•** |  | **•** |  |  |  |  | **•** | **•** | **Advanced Programming** | **ENG 505** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **Information Theory** | **CSE 601** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  |  |  | **•** | **•** | **Queuing Theory** | **CSE 602** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  | **•** |  |  |  | **•** | **Computer Communication Networks** | **CSE 603** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  | **•** |  | **•** | **Pattern Recognition** | **CSE 604** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  | **•** |  | **•** | **Image Processing** | **CSE 605** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  |  |  | **•** | **Digital Electronic Circuits**  | **CSE 606** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **•** | **•** |  | **•** |  |  |  |  | **•** | **•** | **Computer Aided Design** | **CSE 607** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  |  |  | **•** | **Microprocessor and its Applications** | **CSE 608** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  |  |  |  | **•** | **•** | **Advanced Operating Systems** | **CSE 609** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **•** |  | **•** |  |  |  |  | **•** | **•** | **Database Systems** | **CSE 610**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  |  |  |  | **•** | **•** | **Parallel and Distributed Processing** | **CSE 611**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  | **•** |  |  |  | **•** | **Computer Networks** | **CSE 612**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  | **•** | **•** |  | **•** | **•** |  |  | **•** |  | **•** | **Artificial Intelligence** | **CSE 613**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** | **•** |  |  | **•** |  | **•** | **Expert Systems** | **CSE 614**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Optimal Control** | **CSE 615**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Nonlinear Control**  | **CSE 616** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** | **•** |  | **•** |  |  | **•** | **Computer Control** | **CSE 617** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  |  |  |  |  | **•** | **Large Scale Systems** | **CSE 618** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Estimation and Observation in Control Systems** | **CSE 619** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **Selective Topics** | **CSE 620** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  | **•** |  | **•** | **Neural Networks** | **CSE 621** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Stochastic Control Systems**  | **CSE 622** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Systems Design and analysis** | **CSE 623** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  |  |  |  | **•** | **Automata theory** | **CSE 624** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  | **•** | **•** |  | **•** | **•** |  |  |  | **•** | **•** | **Software Engineering** | **CSE 625** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** | **•** |  |  |  |  | **•** | **Remote Sensing** | **CSE 626** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** |  |  |  |  |  | **•** | **Faults Diagnosis Technology** | **CSE 627** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **Geographic Information Systems**  | **CSE 628** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** | **Robotics** | **CSE 629** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  |  |  | **•** | **•** | **Data Structure and Algorithms** | **CSE 630** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **System Identification** | **CSE 631** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Adaptive Control** | **CSE 632** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **Computer Networks Security** | **CSE 633** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** | **•** | **•** |  |  |  | **•** | **Wireless Networks** | **CSE 634** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **•** |  |  |  |  |  |  |  | **•** | **Simulation and Modeling**  | **CSE 635** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  | **•** | **•** |  | **•** | **Intelligent Control** | **CSE 636** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  | **•** |  | **•** | **Genetic Algorithms** | **CSE 637** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **Satellite Navigation Systems** | **CSE 638** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  |  |  |  | **•** |  |  | **•** | **Guidance and Control Systems** | **CSE 639**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **Satellite Communication Systems** | **CSE 640**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **Global Positioning Systems (GPS)** | **CSE 641** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** |  |  |  | **Advanced Topics in Control** | **CSE 642** |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  | **•** | **•** |  | **Advanced Topics in Computers** | **CSE 643**  |
| **•** | **•** | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **•** |  | **•** |  |  |  | **•** |  | **•** | **Neuro-Fuzzy Systems** | **CSE 644** |

|  |
| --- |
| **ANNEX 2:****Program Attributes versus Program ILOs Matrix** |
| **Program ILOs** |  |
| **(d)****General & Trans. Skills** | **(c) Professional****& Practical Skills** | **(b)****Intellectual Skills** | **(a)****Knowledge & Understanding** | **Program Attributes** |
| **d6** | **d5** | **d4** | **d3** | **d2** | **d1** | **c3** | **c2** | **c1** | **b5** | **b4** | **b3** | **b2** | **b1** | **a8** | **a7** | **a6** | **a5** | **a4** | **a3** | **a2** | **a1** |
| **•** |  | **•** | **•** | **•** | **•** | **•** | **•** |  |  | **•** |  |  | **•** |  | **•** |  |  |  |  |  | **•** | **1** |
|  |  | **•** | **•** |  |  | **•** | **•** |  | **•** | **•** | **•** | **•** | **•** |  |  |  | **•** | **•** | **•** | **•** | **•** | **2** |
|  |  |  |  | **•** |  | **•** |  | **•** |  |  | **•** |  |  | **•** | **•** | **•** |  |  |  |  | **•** | **3** |
|  |  |  |  | **•** |  |  |  |  |  |  |  |  | **•** |  | **•** | **•** |  |  |  |  | **•** | **4** |
|  |  |  |  | **•** |  | **•** |  |  | **•** |  | **•** | **•** | **•** |  | **•** | **•** | **•** | **•** | **•** | **•** | **•** | **5** |
|  |  |  |  | **•** |  |  |  | **•** | **•** |  | **•** | **•** | **•** |  |  | **•** |  |  |  |  | **•** | **6** |
|  |  |  |  |  | **•** |  | **•** |  |  |  |  |  |  |  |  |  |  |  |  |  | **•** | **7** |
|  |  |  |  | **•** | **•** | **•** |  | **•** | **•** |  | **•** | **•** | **•** | **•** | **•** | **•** |  |  |  |  | **•** | **8** |
|  | **•** |  |  | **•** |  |  |  |  |  |  |  |  | **•** |  |  | **•** |  |  |  |  | **•** | **9** |
|  |  |  |  | **•** |  |  |  |  |  |  |  |  |  |  | **•** | **•** |  |  |  |  | **•** | **10** |
| **•** |  |  |  |  | **•** |  |  | **•** | **•** | **•** |  |  |  | **•** |  |  |  |  |  |  | **•** | **11** |
|  | **•** |  | **•** | **•** |  |  |  |  |  | **•** |  |  |  |  | **•** |  |  |  |  |  | **•** | **12** |