**DATA FOR ENGINEERING PROGRAM**

**NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES, LAHORE CAMPUS**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Table-I: ACCREDITATION STATUS (PROGRAM-WISE)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S#** | **Program Title** | **Accreditation of****Intake Batches****(Intake from-to)** | **Green Signal****Zero/Interim Visits****(Intake from-to)** |
| **1** | **BS (Telecom Engineering)** | **Accredited****(2002-2008)** | **Green Signal****(2002-2008)** |
| **2** | **BS (Computer Engineering)** | **Accredited****(2003-2008)** | **Green Signal****(2003-2008)** |
| **3** | **BS (Electrical Engineering)** | **Accreditation in process****(2009-2010)** | **Zero/Interim Visits****(2009-2014)** |

**Table-II: STUDENT SUMMARY (PROGRAM–WISE)**

**Name of Engineering Program: BS (Electrical Engineering)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Study Year** | **Batch/ Enrolment Year** | **No. of Students (Registered)** | **No. of sections** |
| **1st year** | **2014** | **117** | **4** |
| **2nd year** | **2013** | **110** | **3** |
| **3rd year** | **2012** | **121** | **3** |
| **4th year** | **2011** | **106** | **3** |
| **Laggers** | **2009-2010** | **66** | **1** |
| **Total** |  | **520** | **14** |

**Table-III: FACULTY SUMMARY (PROGRAM–WISE)**

**Name of Engineering Program: BS (Electrical Engineering)**

|  |  |  |
| --- | --- | --- |
|  | **Faculty Teaching Engineering Subjects** | **Faculty Teaching Non-Engineering Subjects** |
| **BS** | **MS** | **PhD** | **Total** | **BS** | **MS** | **PhD** | **Total** |
| **Program Faculty (Dedicated)** |  | **21** | **8** | **29** |  |  |  |  |
| **Program Faculty (Shared with other programs)** |  |  |  |  |  |  |  |  |
| **Shared Faculty (from other program)** |  |  |  |  |  | **3** | **1** | **4** |
| **Visiting Engineering Faculty (from industry or other university)** |  |  |  |  | **1** | **5** | **3** | **9** |

**Table-IV: STUDENT: TEACHER RATIO (PROGRAM–WISE)**

**Name of Engineering Program: BS (Electrical Engineering)**

|  |  |
| --- | --- |
| 1. **Total Students currently enrolled in the Engineering Program (Including 66 laggers from Batch 09 / 10)**
 | **520** |
| 1. **Total Full time dedicated engineering faculty members**
 | **29** |
|  **Student : Teacher Ratio [A:B]** | **18:1** |

**Note:**

* **Adding 20% non-engineering faculty 15.3: 1**
* **Adding 35% non-engineering faculty 13.3: 1**

**TA’s not included in ratio**

**Table-V: Faculty Details Ratio (Program-Wise)**

**Name of Engineering Program: BS Electrical Engineering**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Name** | **Designation** | **PEC No.** | **Joining Date** | **Details of qualifications** | **Experience (years)** | **Specialization** | **Dedicated/ Shared** |
| **Degree** | **Year** | **Institution** | **Total** | **Teaching** |
| **1** | **Engr. Dr. Arshad Hussain** | **Professor & Head of Department** | **ELECT/ 4846** | **Jun-01** | **PhD** | **1993** | **Polytechnic Uni., USA** | **26** | **20** | **Detection & Estimation, Computer Networks** | **Dedicated** |
| **MS** | **1988** | **George Washington Univ., USA** |
| **BS** | **1984** | **UET, Lahore** |
| **2** | **Engr. Dr. Anjum Ali** | **Professor** | **ELECT/ 21350** | **May-05** | **PhD** | **1988** | **Uni. of Alabama, USA** | **32** | **32** | **Computer Arch., Embedded Systems** | **Dedicated** |
| **MS** | **1981** | **King Fahd University, KSA** |
| **BS** | **1976** | **UET, Lahore** |
| **3** | **Engr. Dr. Syed Amjad Hussain** | **Professor** | **ELECT/5040** | **Feb-01** | **PhD** | **1995** | **Loughborough University, UK** | **28** | **17** | **DSP, Speech processing** | **Dedicated** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **4** | **Engr. Dr. S.M. Sajid** | **Associate Professor** | **ELECT/ 17923** | **Nov-07** | **PhD** | **2007** | **TU-GRAZ, Austria** | **11** | **7.5** | **Optical Wireless Communications** | **Dedicated** |
| **MS** | **2003** | **UET, Lahore** |
| **BS** | **2001** | **UET, Lahore** |
| **5** | **Engr. Dr. Saima Zafar** | **Associate Professor** | **ELECT/ 20971** | **Jun-08** | **PhD** | **2011** | **UET, Lahore** | **15** | **10** | **Wireless Networks** | **Dedicated** |
| **MS** | **2006** | **UET, Lahore** |
| **BS** | **1998** | **UET, Lahore** |
| **6** | **Engr. Dr. Muhammad Imran Cheema** | **Assistant Professor** | **ELECT/ 19073** | **Jan-14** | **PhD** | **2013** | **McGill University,****Canada** | **10.5** | **8** | **Optical systems, Electromagnetic** | **Dedicated** |
| **MS** | **2007** | **University of Colorado Boulder, USA** |
| **BS** | **2002** | **UET, Lahore** |
| **7** | **Engr. Dr. Shahzad Ahmad Butt** | **Assistant Professor** | **ELECT/ 23008** | **Jan-14** | **PhD (EE)** | **2013** | **Polytechnic University of Turin, Italy** | **3** | **1** | **Embedded Systems, High level Synthesis, Hw/ Sw co design** | **Dedicated** |
| **MS** | **2009** | **Polytechnic University of Turin, Italy** |
| **BS** | **2007** | **UET, Lahore** |
| **8** | **Engr. Dr. Muhammad Usman Shahid** | **Assistant Professor** | **TELE/ 00483** | **Jun-14** | **PhD** | **2014** | **Polytechnic University of Turin, Italy** | **1** | **1** | **Parallel Algorithms, Image& Video Processing, High Performance Comp.** | **Dedicated** |
| **MS** | **2010** | **Polytechnic University of Turin, Italy** |
| **BS** | **2007** | **FAST-NU, Islamabad** |
| **9** | **Engr. Kamran Jamal** | **Assistant Professor** | **ELECT/6693** | **Aug-05** | **MS**  | **1990** | **Syracuse Uni., USA** | **22.5** | **12.5** | **VLSI, Electronics, Digital Design** | **Dedicated** |
| **BS** | **1988** | **UET, Lahore** |
| **10** | **Engr. Khawar Ayub** | **Assistant Professor** | **ELECT/21311** | **Jan-06** | **MS**  | **1996** | **UET, Lahore** | **30** | **10** | **Computer Engineering** | **Dedicated** |
| **BS** | **1979** | **UET, Lahore** |
| **11** | **Engr. Faisal Malik** | **Assistant Professor** | **ELECT/ 6000** | **Dec-05** | **MS** | **1996** | **UET, Lahore,**  | **22** | **15** | **Electrical Engineering** | **Dedicated** |
| **BS** | **1986** | **Univ. of Arkansas, USA** |
| **12** | **Engr. Ahmad Raza Malik** | **Assistant Professor** | **ELECT/ 13436** | **Sep-06** | **MS** | **2003** | **LUMS, Lahore** | **13.5** | **11** | **Robotics & Control** | **Dedicated** |
| **BS** | **1996** | **UET, Lahore** |
| **13** | **Engr. Muhammad Abdul Majid** | **Assistant Professor** | **ELECT/ 12627** | **Sep-99** | **MS**  | **2005** | **UET, Lahore** | **16** | **15.5** | **Power Engineering** | **Dedicated** |
| **BS** | **1996** | **UET, Lahore** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **14** | **Engr. A. D. Raza** | **Assistant Professor** | **ELECT/25108** | **Dec-08** | **MS** | **1984** | **UET, Lahore** | **37** | **5.5** | **Information Theory, Switching** | **Dedicated** |
| **BS** | **1973** | **UET, Lahore** |
| **15** | **Engr. Shazia Haque** | **Assistant Professor** | **ELECT/ 16261** | **Jan-09** | **MS** | **2006** | **Univ. of Melbourne, Australia** | **12** | **5** | **Distributed Systems, Database** | **Dedicated** |
| **BS**  | **2000** | **UET, Lahore** |
| **16** | **Engr. Azeem Hafeez** | **Assistant Professor** | **TELE / 2450** | **July-06** | **MS**  | **2009** | **FAST-NU, Lahore** | **8** | **8** | **Telecomm. Engineering** | **Dedicated** |
| **BS** | **2006** | **FAST-NU, Lahore** |
| **17** | **Engr. Mohsin Yousuf** | **Assistant Professor** | **ELECT/ 20974** | **Jul-05** | **MS**  | **2010** | **FAST-NU, Lahore** | **9.5** | **9.3** | **Electrical Engineering** | **Dedicated** |
| **BS** | **2004** | **UET, Lahore** |
| **18** | **Engr. Tamania Javaid** | **Assistant Professor** | **ELECT/21567** | **Nov-06** | **MS** | **2008** | **UET, Lahore** | **11** | **11** | **Computer Engineering** | **Dedicated** |
| **BS** | **2003** | **UET, Lahore** |
| **19** | **Engr. Beenish Fatima** | **Assistant Professor** | **TELE/ 1622** | **Aug-08** | **MS** | **2011** | **FAST-NU, Lahore** | **6** | **6** | **Telecomm. Engineering** | **Dedicated** |
| **BS** | **2008** | **FAST-NU, Lahore** |
| **20** | **Engr. Bushra Rashid** | **Assistant Professor** | **TELE/ 2679** | **Aug-08** | **MS**  | **2012** | **FAST-NU, Lahore** | **6** | **6** | **Telecomm. Engineering** | **Dedicated** |
| **BS** | **2008** | **FAST-NU, Lahore** |
| **21** | **Engr. Tooba Javed** | **Assistant Professor** | **COMP / 7226** | **Aug-09** | **MS**  | **2012** | **FAST-NU, Lahore** | **5** | **5** | **Computer Engineering** | **Dedicated** |
| **BS** | **2009** | **FAST-NU, Lahore** |
| **22** | **Engr. Muhammad Ahmad Raza** | **Assistant Professor** | **TELE/ 2077** | **Aug-08** | **MS** | **2013** | **FAST-NU, Lahore** | **6** | **6** | **Telecomm. Engineering** | **Dedicated** |
| **BS** | **2008** | **FAST-NU, Lahore** |
| **23** | **Engr. Maimoona Akram** | **Assistant Professor** | **COMP/ 7463** | **Aug-08** | **MS** | **2013** | **FAST-NU, Lahore** | **6** | **6** | **Computer Engineering** | **Dedicated** |
| **BS** | **2008** | **FAST-NU, Lahore** |
| **24** | **Engr. Syed Haris Mujtaba Kazmi** | **Assistant Professor** | **Electro/ 07156** | **Mar-06** | **MS** | **2009** | **Hamdard University, Karachi** | **10** | **8.5** | **Communication & Signal Processing** | **Dedicated** |
| **BS** | **2003** | **Sir Syed UET, Karachi** |
| **25** | **Engr. Syed Muhammad Ammar Sohail** | **Assistant Professor** | **TELE/ 2246** | **Aug-09** | **MS** |  | **FAST-NU, Lahore** | **5** | **5** | **Communication** |  |
| **BS** | **2009** | **FAST-NU, Lahore** |
| **26** | **Engr. Omer Saleem Bhatti** | **Assistant Professor** | **ELECT/ 30555** | **Aug-10** | **MS** | **2014** | **UET, Lahore** | **4** | **4** | **Embedded Robotics & Electronics, Measurement & Control Sys** | **Dedicated** |
| **BS** | **2010** | **UET, Lahore** |
| **27** | **Engr. Hina Tariq** | **Assistant Professor** | **COMP/ 8490** | **Feb-12** | **MS** | **2013** | **FAST-NU, Lahore** | **5** | **4** | **Computer Engineering** | **Dedicated** |
| **BS** | **2009** | **FAST-NU, Lahore** |
| **28** | **Engr. Akbare Yaqub** | **Lecturer** | **ELECT/ 14420** | **Oct-06** | **MS** | **2014** | **UMT, Lahore** | **8** | **8** | **Communication** | **Dedicated** |
| **BS** | **1996** | **UET, Lahore** |
| **29** | **Engr. Farah Nadeem** | **Lecturer** | **Elect/ 34465** | **Mar-14** | **MS** | **2014** | **FAST-NU, Lahore** | **2** | **2** | **Telecommunication Engineering** | **Dedicated** |
| **BS** | **2008** | **NUST, Rawalpindi** |
| **30** | **Engr. Shazia Ahmed** | **Lecturer** | **ELECT/ 16585** | **Dec-06** | **BS** | **1999** | **UET, Lahore** | **11** | **6** | **Electronics & Communications** | **Dedicated** |
| **31** | **Engr. Sara Kiran** | **Lab. Engineer** | **Tele/ 3214** | **Feb-12** | **BS**  | **2009** | **FAST-NU, Karachi** | **4.5** | **3.5** | **Telecomm. Engineering** | **Dedicated** |
| **32** | **Engr. Samia Mahmood** | **Lab. Engineer** | **TELE/ 4417** | **Sep-12** | **BS** | **2009** | **FAST-NU, Lahore** | **3.5** | **1.5** | **Telecomm. Engineering** | **Dedicated** |
| **33** | **Engr. Khawaja Humble Hassan** | **Lab. Engineer** | **TELE/ 04403** | **Sep-12** | **BS** | **2012** | **FAST-NU, Lahore** | **2** | **2** | **Telecomm. Engineering** | **Dedicated** |
| **34** | **Engr. Waqas Ur Rehman** | **Lab. Engineer** | **-** | **Apr-14** | **BS** | **2013** | **FAST-NU, Lahore** | **0.5** | **0.5** | **Electrical Engineering** | **Dedicated** |
| **35** | **Engr. Maria Nasir** | **Lab. Engineer** | **-** | **Jul-14** | **BS** | **2014** | **UET, Lahore** | **0.5** | **0.5** | **Electrical Engineering** | **Dedicated** |
| **36** | **Engr. Faisal Abbas** | **Lab. Engineer** | **-** | **Jul-14** | **BS** | **2014** | **FAST-NU, Lahore** | **0.5** | **0.5** | **Electrical Engineering** | **Dedicated** |
| **37** | **Engr. Muhammad Umer Mumtaz** | **Lab. Engineer** | **ELECT/40926** | **Aug-14** | **BS** | **2013** | **UET, Taxila** | **1** | **1** | **Power Engineering** | **Dedicated** |
| **38** | **Engr. Rabia Khan** | **Lab. Engineer** | **Applied** | **Aug-14** | **BS** | **2014** | **UET, Lahore** | **0.5** | **0.5** | **Electrical Engineering** | **Dedicated** |
| **39** | **Engr. Ahmed Hassan** | **Lab. Engineer** | **ELECT/34003** | **Aug-14** | **BS** | **2012** | **NED UET, Karachi** | **2.5** | **0.5** | **Power Engineering** | **Dedicated** |

|  |
| --- |
| **Table-VI: LABORATORY DETAILS (PROGRAM-WISE)****Name of Engineering Program: BS (Electrical Engineering)** |
|  |  |  |  |  |  |  |  |  |
| **Number of Total Engineering Computing Courses:** | **41** |  |  |
|  |  |  |  |  |  |  |  |  |
| **Number of Lab Courses:** |  |  | **16** |  |  |
|  |  |  |  |  |  |  |  |  |
| **Number of Laboratories:** |  |  | **10** |  |  |
|  |  |  |  |  |  |  |  |  |

**Engineering Laboratories**

| **Sr** | **Name of Laboratory** | **Staff Name – Qual.** | **Lab(s) of Course(s) Conducted in the Lab.** | **Type(s) of Workstations** | **Nature of Experiments** | **No. of Students per Workstation** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | **Circuits /****Engineering Workshop Lab** | **Please see Annex-A** | **Please see Annex-B**  | **Circuits Lab:**1. **Digital Power Supply (15)**
2. **Oscilloscope (15)**
3. **Signal Generator (15)**
4. **Digital Multi-Meter (15)**
5. **Clamp Meter (10)**
6. **Bread Board (15)**

**Workshop Lab:**1. **Lathe Machine (1)**
2. **Welding Plant (1)**
3. **Drill Machine (2)**
4. **Grander Saan (1)**
5. **Hack Saw (1)**
6. **Wooden Smoother (1)**
7. **Electric Cutter (1)**
8. **Soldering Iron (6)**
9. **PCB Screen Printing (5)**
10. **Electric Wiring Tools**

**(Pliers, Cutter, Screw Drivers etc) (20)** | **Hands-on** | **2** |
| **2** | **Electronics Lab** | **-do-** | **-do-** | 1. **Digital Power Supply (14)**
2. **Oscilloscope (13)**
3. **Signal Generator (13)**
4. **Digital Multi-Meter (13)**
5. **Bread Board (22)**
 | **Hands-on** | **2** |
| **3** | **Communication Lab** | **-do-** | **-do-** | 1. **Analogue Communication Trainer (26)**
2. **Digital Power Supply (17)**
3. **Oscilloscope (17)**
4. **Signal Generator (17)**
5. **Digital Multi-Meter (17)**
6. **Bread Board (19)**
 | **Hands-on** | **2** |
| **4** | **Microprocessor Lab** | **-do-** | **-do-** | 1. **Microcontroller Trainer (18)**
2. **Computer (22)**
3. **Advance Digital Trainers (15)**
4. **Logic Trainer (EES) (18)**
5. **Seven Segment Display (8)**
6. **DSP Boards (TMS 320) (11)**
7. **Spartan FPGA Boards (10)**
 | **Hands-on** | **2** |
| **5** | **Electro-Mechanical Systems Lab** | **-do-** | **-do-** | 1. **Electric Traction & Electrical Control**
2. **Trainer (7)**
3. **Three Phase Transformer Trainer (6)**
4. **AC Machine Trainer (6)**
5. **Dc Machine Trainer (2)**
6. **Three Phase Variable Transformer(6)**
7. **Digital Multi-Meter(10)**
8. **Digital Tachometer (7)**
9. **Watt Meter (4)**
 | **Hands-on** | **2** |
| **6** | **Instrumentation /****Power Electronics Lab** | **-do-** | **-do-** | 1. **Digital Storage Oscilloscope (10)**
2. **Digital Function Generator(10)**
3. **Digital Multi-Meter (10)**
4. **Digital Power Supply (10)**
5. **LCR Meter (10)**
6. **Bread Boards (10)**
7. **Computers (Dell) (10)**
8. **M Series DAQ (10)**
9. **Signal Conditioning Module (10)**
10. **Isolated digital output module (10)**
11. **Thermocouple Input Module (10)**
12. **EKG Sensor (10)**
13. **Gas Pressure Sensor (10)**
14. **Motion Detector (10)**
15. **Photo-gate (10)**
16. **Low-g Accelerometer (10)**
 | **Hands-on** | **2** |
| **7** | **Embedded Control Lab** | **-do-** | **-do-** | 1. **Computers (20)**
2. **Advance Digital Trainers (15)**
3. **MiKroElektronika Board (6)**
4. **DSPIC Board (10)**
5. **Logic Trainers (EES) (15)**
 | **Hands-on** | **2** |
| **8** | **Digital Control Systems Lab** | **-do-** | **-do-** | 1. **NI ELVIS II Trainers (10)**
2. **DC Motor Control Modules (10)**
3. **Rotary Pendulum Modules (10)**
4. **Bread Board Modules (10)**
5. **Computers (Dell) (10)**
6. **PLC Module (S7 -1200 (6)**
7. **PLC Trainers (XT-2401-XP) (5)**
8. **Traffic Light control Module**
9. **Temperature control Module (5)**
10. **Water Level control Module (5)**
11. **Conveyers Control Module (5)**
12. **Elevator Control Module (5)**
 | **Hands-on** | **2** |
| **9** | **EE Project Lab** | **-do-** | **-do-** | 1. **Logic Analyzer 136 Channel (1)**
2. **Oscilloscope 1 GHZ (1)**
3. **RF Signal Generator 3 GHz (1)**
4. **Spectrum Analyzer 3 GHz (1)**
5. **CNC Machine (1)**
6. **Oscilloscope (13)**
7. **Function Generator (13)**
8. **Digital Power Supply (12)**
9. **Digital Multi-Meter (16)**
10. **LCR Meter (2)**
11. **Computers (17)**
 | **Hands-on** | **2** |
| **10** | **Engineering Computer Lab** | **-do-** | **-do-** | **Computers (P-IV) (51)** | **Hands-on +****Demonstration** | **1** |

**Annex-A**

**Lab Staff**

|  |  |  |
| --- | --- | --- |
| **Sr. No** | **Name** | **Qualification** |
| **1** | **Muhammad Abid** | **BE Telecom** |
| **2** | **Sabir Rasool** | **BE Telecom** |
| **3** | **Rizwan Majeed** | **BTech Hons** |
| **4** | **Kashif Bashir** | **BTech Hons** |
| **5** | **Malik M. Tahir** | **BTech Hons** |
| **6** | **Arslan Ahmad** | **BTech Hons** |
| **7** | **Muhammad Zubair** | **BTech Hons** |
| **8** | **M. Usman Sadiq** | **BTech Hons** |
| **9** | **Fiaz Saeed** | **BTech Hons** |
| **10** | **Amer Irshad** | **MS(CS)** |

**Maintenance and Purchase Staff:**

* + **Muhammad Ammar (DAE)**
	+ **Tahir Mahmood (DAE)**
	+ **Shabnam Mahmood (DAE)**
	+ **Junaid Iqbal (DAE)**

**Store Keeper:**

* **Muhammad Faisal (TTC)**

**Annex-B**

**Labs Assigned to Lab Engineers and Lab Assistants**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Physical Laboratory** | **Labs Conducted** | **Lab Engineer** | **Lab Assistant & Qualification** |
| **1** | **Circuits/ Engineering Workshop** | **Circuit Analysis-I & II/ Engineering Workshop** | **Mr. Ahmed Hassan** | **Mr. Muhammad Zubair (BTech Hons)** |
| **2** | **Electronics** | **Electronic Devices & Circuits/****Electronic Circuit Design** | **Ms. Shazia Ahmed** | **Mr. Sabir Rasool (BE)** |
| **3** | **EE Project** | **Students work on FYPs only** | **Ms. Sara Kiran** **(Mr. Omer Saleem: Lab Incharge)** | **Mr. Muhammad Abid (BE)** |
| **4** | **Digital Control Systems** | **Feedback Control Systems/** **Industrial Process Control** | **Mr. Faisal Abbas** | **Mr. Muhammad Usman (BTech Hons)** |
| **5** | **Electro-Mechanical Systems** | **Electro-Mechanical Systems** | **Ms. Rabia Khan**  | **Mr. Muhammad Kashif (BTech Hons)** |
| **6** | **Instrument. & Measurement** | **Instrument. & Measurement** | **Ms. Maria Nasir**  | **Mr. Fiaz Saeed (BTech Hons)** |
| **7** | **Power Electronics/ Communication** | **Power Electronics /** **Analogue & Digital Comm.** | **Mr. Waqas Ur Rehman** | **Mr. Arslan Ahmad (BTech Hons)** |
| **8** | **Microprocessor** | **Microprocessor Interfacing & Prog./ Computer Logic Design/****Digital Signal Processing (Hardware)** | **Mr. Muhammad Umer Mumtaz** | **Mr. Muhammad Tahir (BTech Hons)** |
| **9** | **Embedded Control** | **Embedded Systems** | **Ms. Samia Mahmood** **(Ms. Tooba Javed: Lab Incharge)** | **Mr. Noman Naimat (BTech Pass)** |
| **10** | **Engineering Computer** | **Prog. for Engineers-I & II/****Signals & Systems/** **Digital Signal Processing (Software)/** **Data Comm. & Networks** | **Mr. Humble Hassan** | **Mr. Amer Irshad (M.Sc. Computer Sc.)** |