# DEPARTMENT OF COMPUTER ENGINEERING
## Z.H. COLLEGE OF ENGINEERING & TECHNOLOGY
## ALIGARH MUSLIM UNIVERSITY, ALIGARH

**Valid for students admitted in year 2017 onwards**

**Course Structure: B.Tech. Computer Engineering**

**SEMESTER 1: Sections A, B, C / SEMESTER 2: Sections D, E, F**

| S.No | Course Category | Course No. | Course title | L | T | P | Credits | Course-Work | Mid-Sem | End-Sem | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|-------------|---------|---------|-------|-----------------------|
| 1 | BS | ACS1110 | Applied Chemistry | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | BS | AMS1110 | Mathematics-I | 0 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | ESA | EEA1110 | Basics of Electrical Engineering | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 5 | ESA | CEA1110 | Environmental Studies | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 5 | ESA | MEA1110 | Thermal Sciences | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 6 | BS | ACS1910 | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 | 60 | | 40 | 100 | |
| 7 | ESA | COA1910* | Computer Programming Lab | 0 | 0 | 3 | 1.5 | 60 | | 40 | 100 | |
| 8 | ESA | MEA1910 | Engineering Graphics Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| | | | **TOTAL CREDITS:** | | | | **23** | | | | | |

\* COA-1910 will be coordinated by Department of Computer Engineering and will be shared by Departments of Electronics, Mechanical, Applied Mathematics, Civil and the Assistant Professors in Central Computational Facility, Z.H. College of Engineering & Technology.

**SEMESTER 2: Sections A, B, C / SEMESTER 1: Sections D, E, F**

| S.No | Course Category | Course No. | Course title | L | T | P | Credits | Course-Work | Mid-Sem | End-Sem | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|-------------|---------|---------|-------|-----------------------|
| 1 | BS | AMS1120 | Mathematics-II | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | BS | APS1110 | Applied Physics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | ESA | CEA1120 | Fundamentals of Structures | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 4 | ESA | ELA1110 | Principles of Electronics Engineering | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 5 | ESA | MEA1120 | Engineering Mechanics | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 6 | HM | EZH1110 | English | 2 | 1 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 7 | BS | APS1910 | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 60 | | 40 | 100 | |
| 8 | ESA | MEA1920 | Manufacturing Process Lab | 0 | 0 | 3 | 1.5 | 60 | | 40 | 100 | |
| | | | **TOTAL CREDITS:** | | | | **23** | | | | | |

**Course Structure: B.Tech. Computer Engineering**

**SEMESTER 3:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|-----|---|---|---------|-------|---|---|-------|------------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | BS | AMS2610 | Higher Mathematics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS1110 / AMS1120 |
| 2 | ESA | ELA2110 | Electronic Devices & Circuits | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | ELA1110 |
| 3 | DC | COC2030 | Object Oriented Programming | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | DC | COC2060 | Data Structure and Algorithm | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 5 | DC | COC2070 | Digital Logic and System Design | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 6 | HM | EZH2910 | Communication Skill Laboratory | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| 7 | DC | COC2910 | Data Structure & OOP Laboratory | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | | **TOTAL CREDITS:** | **24** | | | | | |

**SEMESTER 4:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|-----|---|---|---------|-------|---|---|-------|------------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | BS | AMS2620 | Numerical Analysis, Transforms and Probability | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS1110 / AMS1120 |
| 2 | BS | AMS2630 | Discrete Structures | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | ESA | ELA2410 | Signals & Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | DC | COC2080 | Computer Architecture | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | COC2070 |
| 5 | DC | COC2090 | Software Engineering | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 6 | DC | COC2140 | Design & Analysis of Algorithm | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | COC2060 |
| 7 | ESA | ELA2900 | Electronics Laboratory | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | ELA1110 / ELA2110 |
| 8 | DC | COC2920 | Digital Design & Simulation Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | COC2070 |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | | | | **TOTAL CREDITS:** | **28** | | | | | |

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**SEMESTER 5:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|---------------|----------|----------|-------|------------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | OE | ---- | Open Elective-I | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | ESA | ELA3400 | Communication Engineering | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | ELA2410 |
| 3 | HM | MEH3110 | Economics & Management | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | DC | COC3080 | Digital Electronics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | ELA1110 / ELA2110 |
| 5 | DC | COC3090 | Microprocessor Theory & Applications | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | COC2070 / COC2080 |
| 6 | DC | COC3100 | Operating Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | COC2080 |
| 7 | DC | COC3950 | Minor Project | 0 | 0 | 6 | 3 | 60 | | 40 | 100 | COC2090 |
| 8 | DC | COC3930 | Algorithms & Operating Systems Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | **TOTAL CREDITS:** | | | | **29** | | | | | |

**SEMESTER 6:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|---------------|----------|----------|-------|------------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | HM | EZH3010 | Intellectual Property Rights for Engineers | 3 | 0 | 0 | 3 | 15 | 25 | 60 | 100 | |
| 2 | DC | COC3110 | Theory of Computation | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS2630 / COC2070 |
| 3 | DC | COC3120 | Database Management System | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS2630 / COC2060 |
| 4 | DC | COC3130 | Computer Networks | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | COC2080 / ELA3400 |
| 5 | DC | COC3150 | Computer Graphics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS1110 / AMS1120 |
| 6 | DC | COC3800 | Colloquium | 0 | 2 | 0 | 2 | 60 | | 40 | 100 | EZH1110 / EZH2910 |
| 7 | DC | COC3960 | Advanced Computing Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| 8 | DC | COC3940 | Microprocessor Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | COC3090 |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | **TOTAL CREDITS:** | | | | **25** | | | | | |

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**Course Structure: B.Tech. Computer Engineering**

**SEMESTER 7:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|-------------------|----------|----------|-------|-----------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | DE | COE4xx0 | Departmental Elective-I | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | DE | COE4xx0 | Departmental Elective-II | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | DE | COE4xx0 | Departmental Elective-III | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | DC | COC4010 | Information Security | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS2630 |
| 5 | DC | COC4060 | Compiler Design | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | AMS2630 / COC3110 |
| 6 | DC | COC4980 | B.Tech Project Part-I | 0 | 0 | 8 | 4 | 60 | | 40 | 100 | COC2090 |
| 7 | DC | COC4950 | Network & Embedded System Lab | 0 | 1 | 2 | 2 | 60 | | 40 | 100 | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | **TOTAL CREDITS:** | | | | **26** | | | | | |

**SEMESTER 8:**

| S.No | Course Category | Course No. | Course title | Contact Periods | | | Credits | Marks | | | Total | Pre-Requisite Courses |
|------|-----------------|------------|--------------|---|---|---|---------|-------------------|----------|----------|-------|-----------------------|
| | | | | L | T | P | | Course-Work | Mid-Sem | End-Sem | | |
| 1 | DE | COE4xx0 | Departmental Elective-IV | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | DE | COE4xx0 | Departmental Elective-V | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | DE | COE4xx0 | Departmental Elective-VI | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | OE | ---- | Open Elective - II | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 5 | DC | COC4990 | B.Tech Project Part-II | 0 | 0 | 12 | 6 | 60 | | 40 | 100 | COC2090 |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| | | | **TOTAL CREDITS:** | | | | **22** | | | | | |

**SUMMARY:**

| Category Code | Category Name | Credits | Required |
|:---:|:---|:---:|:---:|
| DC | Departmental Core | 87 | 60 – 116 |
| DE | Departmental Elective | 24 | 16 – 32 |
| BS | Basic Sciences | 31 | 20 – 36 |
| ESA | Engineering Science and Arts | 38 | 20 – 40 |
| OE | Open Elective | 8 | 8 |
| HM | Humanities | 12 | 10 – 18 |
| | **TOTAL CREDITS:** | **200** | |

**Course Structure: B.Tech.**  |  **COMPUTER ENGINEERING**

## DEPARTMENTAL ELECTIVE COURSES

| S.No. | Course Category | Course No. | Course title | L | T | P | Credits | Course-Work | Mid-Sem. | End-Sem. | Total | Pre-Requisite Courses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DE | COE4030 | Design of Programming Languages | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | DE | COE4300 | Artificial Intelligence & Neural Network | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 3 | DE | COE4310 | Internet Tools | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 4 | DE | COE4320 | Image Processing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 5 | DE | COE4360 | Information Technology | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 6 | DE | COE4380 | Selected Topics in Computer Application | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 7 | DE | COE4390 | Advance Microprocessor System & Design | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 8 | DE | COE4410 | Pattern Recognition & Computer Vision | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 9 | DE | COE4420 | VLSI Design Tools & Techniques | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 10 | DE | COE4440 | Soft Computing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 11 | DE | COE4450 | Network Security | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 12 | DE | COE4480 | Embedded Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 13 | DE | COE4490 | Internet Protocol | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 14 | DE | COE4500 | Multimedia Technologies | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 15 | DE | COE4510 | Computer Network Design | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 16 | DE | COE4520 | Mobile Computing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 17 | DE | COE4530 | Artificial Intelligence and Soft Computing | 0 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 18 | DE | COE4540 | Software Testing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 19 | DE | COE4550 | Real Time Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 20 | DE | COE4560 | Big Data Analytics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 21 | DE | COE4570 | Internet of Things | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 22 | DE | COE4580 | Cloud Computing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 23 | DE | COE4590 | Distributed & Parallel Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 24 | DE | COE4600 | Principles of Cyber Physical Systems | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 25 | DE | COE4610 | Principles of Machine Learning | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 26 | DE | COE4620 | Bioinformatics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 27 | DE | COE4630 | Human Centric Computing | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 28 | DE | COE4640 | Scientometrics | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |

## OPEN ELECTIVE COURSES

| S.No. | Course Category | Course No. | Course title | L | T | P | Credits | Course-Work | Mid-Sem. | End-Sem. | Total | Pre-Requisite Courses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OE | COO4460 | Selected Topics in Computer Engineering-I | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | OE | COO4470 | Selected Topics in Computer Engineering-II | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |
| 2 | OE | COO4330 | Smart Grids | 3 | 1 | 0 | 4 | 15 | 25 | 60 | 100 | |

## COURSE(S) FOR ELECTRONICS ENGINEERING DEPARTMENT

| S.No. | Course Category | Course No. | Course title | L | T | P | Credits | Course-Work | Mid-Sem. | End-Sem. | Total | Pre-Requisite Courses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ESA | COA3600 | Data Structures & Programming | 3 | 0 | 0 | 3 | 15 | 25 | 60 | 100 | |

| | OLD COURSE | | | | EQUIVALENT NEW COURSE | | | |
|---|---|---|---|---|---|---|---|---|
| S.No. | Course Category | Course No. | Course title | Credits | Course Category | Course No. | Course title | Credits |
| 1 | BS | AM261 | Higher Mathematics | 4 | BS | AMS2610 | Higher Mathematics | 4 |
| 2 | ESA | EL211 | Electronic Devices & Circuits | 4 | ESA | ELA2110 | Electronic Devices & Circuits | 4 |
| 3 | DC | CO203 | Object Oriented Programming | 4 | DC | COC2030 | Object Oriented Programming | 4 |
| 4 | DC | CO206 | Algorithm and Data Structure | 4 | DC | COC2060 | Data Structure and Algorithm | 4 |
| 5 | DC | CO207 | Logic Theory & Computer Organization | 4 | DC | COC2070 | Digital Logic and System Design | 4 |
| 6 | HM | EZ291 | Communication Skill Laboratory | 2 | HM | EZH2910 | Communication Skill Laboratory | 2 |
| 7 | DC | CO291 | Programming Laboratory | 2 | | | **NO EQUIVALENCE** | |
| 1 | BS | AM262 | Numerical Analysis, Transforms and Probability | 4 | BS | AMS2620 | Numerical Analysis, Transforms and Probability | 4 |
| 2 | BS | AM263 | Discrete Structures | 4 | BS | AMS2630 | Discrete Structures | 4 |
| 3 | ESA | EL241 | Signals & Systems | 4 | ESA | ELA2410 | Signals & Systems | 4 |
| 4 | DC | CO208 | Computer Architecture | 4 | DC | COC2080 | Computer Architecture | 4 |
| 5 | DC | CO209 | Software Engineering | 4 | DC | COC2090 | Software Engineering | 4 |
| 6 | ESA | EL290 | Electronics Laboratory | 2 | ESA | ELA2900 | Electronics Laboratory | 2 |
| 7 | DC | CO292 | Data Structure Laboratory | 2 | DC | COC2910 | Data Structure & OOP Laboratory | 2 |
| 2 | ESA | EL340 | Communication Engineering | 4 | ESA | ELA3400 | Communication Engineering | 4 |
| 3 | HM | ME340 | Economics & Management | 4 | HM | MEH3400 | Economics & Management | 4 |
| 4 | DC | CO308 | Digital Electronics | 4 | DC | COC3080 | Digital Electronics | 4 |
| 5 | DC | CO309 | Microprocessor Theory and Applications | 4 | DC | COC3090 | Microprocessor Theory and Applications | 4 |
| 6 | DC | CO310 | Operating Systems | 4 | DC | COC3100 | Operating Systems | 4 |
| 7 | DC | CO395 | Minor Project | 3 | DC | COC3950 | Minor Project | 3 |
| 8 | DC | CO393 | Software Laboratory-I | 2 | DC | COC3930 | Algorithms & Operating Systems Lab | 2 |
| 2 | DC | CO311 | Theory of Computation | 4 | DC | COC3110 | Theory of Computation | 4 |
| 3 | DC | CO312 | Database Management System | 4 | DC | COC3120 | Database Management System | 4 |
| 4 | DC | CO313 | Computer Networks | 4 | DC | COC3130 | Computer Networks | 4 |
| 5 | DC | CO314 | Design & Analysis of Algorithm | 4 | DC | COC2140 | Design & Analysis of Algorithm | 4 |
| 6 | DC | CO315 | Computer Graphics | 4 | DC | COC3150 | Computer Graphics | 4 |
| 7 | DC | CO380 | Colloquium | 2 | DC | COC3800 | Colloquium | 2 |
| 8 | DC | CO396 | Software Laboratory-II | 2 | DC | COC3960 | Advanced Computing Lab | 2 |
| 9 | DC | CO394 | Microprocessor Laboratory | 2 | DC | COC3940 | Microprocessor Lab | 2 |
| 5 | DC | CO406 | Compiler Design | 4 | DC | COC4060 | Compiler Design | 4 |
| 6 | DC | CO499A | B.Tech Project Part-I | 4 | DC | COC4980 | B.Tech Project Part-I | 4 |
| 7 | DC | CO495 | Network & Embedded System Lab | 2 | DC | COC4950 | Network & Embedded System Lab | 2 |
| 4 | DC | CO405 | Distributed & Parallel Systems | 4 | DE | COE4590 | Distributed & Parallel Systems | 4 |
| 5 | DC | CO499B | B.tech Project Part-II | 5 | DC | COC4990 | B.Tech Project Part-II | 6 |