



# STEP

Specialized Tracks of Engineering Profession

## **PART [C]: SPECIALIZED PROGRAMS**

### **(5) Communication and Computer Engineering Program (CCE)**

برنامج هندسة الاتصالات والحاسبات



جامعة القاهرة  
Cairo  
University

## BYLAWS 2023 Bachelor of Science Degree Credit Hours System



كلية الهندسة  
Faculty of  
Engineering

### (5) Communication and Computer Engineering Program (CCE)

برنامج هندسة الاتصالات والحاسبات

#### VISION رؤية البرنامج

The vision of the program is to be the reference model for international communications and computer engineering departments.

#### MISSION رسالة البرنامج

The mission of the Communications and Computer Engineering Program at Cairo University is to provide the highest standard of excellence in higher education while pursuing continuous quality improvement. The goal of the program is to provide the community with communications and computer innovative graduates capable of effectively using the scientific and technical knowledge developed as undergraduates for the betterment of society. The problem-solving, teamwork, and oral communications skills developed by the graduates of CCE Program will also contribute to achieving this goal. The program supports this mission by providing students with appropriate curricula and educational experiences. The curricula remain current through continuous assessment by employers, faculty, and students. Students obtain a broad education necessary to understand the impact of communications and computer engineering solutions in a global, societal, and cultural context.

The CCE bachelor-degree program allows a plan that will necessarily be highly structured during the first five semesters and relatively flexible during the upper three semesters. The program provides a laboratory-based curriculum that combines hands-on practice with the appropriate basic electrical and electronic theory. It is application-oriented and is designed to prepare well rounded graduates who can succeed in one or more of the fields related to communications and computer engineering technology.

#### GRADUATE ATTRIBUTES مواصفات الخريج

The graduate attributes of the CCE program are achieved through satisfying the national as well as the international quality assurance standards.

Thus, the CCE program has adopted the 2018 National Academic Reference Standards (NARS 2018) for Engineering issued by NAQAAE, (National Authority for Quality Assurance and Accreditation for Education).



جامعة القاهرة  
Cairo  
University

## BYLAWS 2023 Bachelor of Science Degree Credit Hours System



كلية الهندسة  
Faculty of  
Engineering

Moreover, the 2022-2023 ABET standards have been also acquired as defined below:

1. ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### PROGRAM BENCHMARK مرجعية البرنامج

Based upon the 2018 National Academic Reference Standards (NARS 2018) for Engineering issued by NAQAAE, CCE Program adopts the following:

| NARS 2018 | LEVEL A                   | LEVEL B         | LEVEL C   | LEVEL D |
|-----------|---------------------------|-----------------|-----------|---------|
|           | Totally Adopted<br>P. A11 | Totally Adopted | See below |         |

In addition to the Engineering competencies, Electrical Engineer competencies, the CCE graduate must be able to:

#### LEVEL C:

C.1 Understand and apply advanced mathematics, such as differential equations, linear algebra, complex variables, and discrete mathematics in the field of specialization.



جامعة القاهرة  
Cairo  
University

## BYLAWS 2023 Bachelor of Science Degree Credit Hours System



كلية الهندسة  
Faculty of  
Engineering

C.2 Analyse and Design of communication systems and networks for different services based on communication theory fundamentals.

C.3 Apply computing science and artificial intelligence necessary to analyze and design complex electrical and electronic devices, control and communication systems containing hardware and software components.

C.4 Demonstrate an understanding of, and apply current theories to, models, and techniques that provide a basis for problem identification and analysis, software design, development, construction and implementation, verification and validation, documentation and quantitative analysis of design elements and software architectures.

C.5 Design, deploy, administer and manage computer networks, and implement software for communications system.

C.6 Analyze and evaluate performance of computer architectures, operating systems, database systems including parallel and distributed platforms, as well as developing and optimizing software for them.

### **Students choosing track E must be able to:**

C.7E Understand and apply the principles of electromagnetic theory and wave propagation, the characterization, design and operation of microwave devices, antennas and wave guides.

C.8E Understand and apply the principles of microelectronics in different circuit implementations, choose between different electronic circuit architectures, design different electronic circuits to meet required specifications.

C.9E Analyze, design and develop applications in communication systems and control systems

### **Students choosing track C must be able to:**

C.7C Analyze, evaluate, select, design and develop hardware and software platforms suitable for intelligent applications, information systems, data systems and real-time embedded systems

C.8C Understand, implement and manage the security and safety of computer systems and networks.



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

**SPECIALIZED COURSES CONTENTS توصيف المقررات**

| Code         | Name                  | Credit Hours | Category | Pre-requisite           |
|--------------|-----------------------|--------------|----------|-------------------------|
| CCES280      | Engineering Seminar   | 1            | DR       | 30 CR.HRS. + AA APROVAL |
| CCES281      | Industrial Training-1 | 1            | FR       | 60 CR.HRS. + AA APROVAL |
| CCES381      | Industrial Training-2 | 2            | DR       | CCES281 + AA APPROVAL   |
| CCES481      | Graduation Project-1  | 1            | FR       | 110 CR.HRS. + SOPHOMORE |
| CCES482      | Graduation Project-2  | 3            | DR       | CCES481 + AA APROVAL    |
| <b>Total</b> |                       | <b>2+6</b>   |          |                         |

**COURSES CONTENTS توصيف المقررات**

| Code                        | Name/Content  | Credit Hours | Contact Hours |         |          |     |      |          |          | Total |
|-----------------------------|---|--------------|---------------|---------|----------|-----|------|----------|----------|-------|
|                             |   |              | Lec           | Tut (2) | App. Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| <b>Faculty Requirements</b> |   |              |               |         |          |     |      |          |          |       |
| CCES280                     | Engineering Seminar   | 1            | 1             |         |          |     |      |          |          |       |
|                             | Pre-requisites: 30 CR.HRS. + AA APROVAL<br>Talks and presentations are invited from industrial establishments relevant to the program. The guest speaker should discuss the organization, management, and recent technologies implemented in his/her industrial establishment. Students exercise writing brief technical reports on the guest presentation and deliver their own presentation about the topic. <i>The course is graded as Pass/Fail grade-system.</i>   |              |               |         |          |     |      |          |          |       |
| CCES281                     | Industrial Training-1   | 1            |               |         |          |     |      |          |          |       |
|                             | Pre-requisites: 60 CR.HRS. + AA APPROVAL<br>Training on industrial establishments relevant to the program. Training lasts for total of 90 hours, during a minimum period of three weeks. The program training advisor schedules at least one follow up visit to the training venue and formally report on performance of trainee(s). A Mentor in the industrial establishment provides a formal report on the student's performance during training. The student submits a formal report and presentation to be |              |               |         |          |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code    | Name/Content  | Credit Hours | Contact Hours |         |          |     |      |          |          | Total |
|---------|---|--------------|---------------|---------|----------|-----|------|----------|----------|-------|
|         |   |              | Lec           | Tut (2) | App. Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
|         | evaluated by a panel of three members with one member being an external examiner appointed from industry or other colleges of engineering. <i>The course is graded as Pass/Fail grade-system.</i>   |              |               |         |          |     |      |          |          |       |
| CCES381 | Industrial Training-2   | 2            |               |         |          |     |      |          |          |       |
|         | Pre-requisites: CCES281 + AA APPROVAL   |              |               |         |          |     |      |          |          |       |
|         | Training on industrial establishments relevant to the program. Training lasts for total of 180 hours, during a minimum period of six weeks. The program training advisor schedules at least two follow-up visits to the training venue and formally report on performance of trainee(s). A Mentor in the industrial establishment provides a formal report on the student's performance during training. The student submits a formal report and presentation to be evaluated by a panel of three members with one member being an external examiner appointed from industry or other colleges of engineering. <i>The course is graded as Pass/Fail grade-system.</i>                             |              |               |         |          |     |      |          |          |       |
| CCES481 | Graduation Project-1  | 1            |               | 2       |          |     |      |          |          |       |
|         | Pre-requisites: 110 CR.HRS. + SOPHCMORE+ AA approval  |              |               |         |          |     |      |          |          |       |
|         | Students – in groups (or individually in some programs) - undertake a final project as part of the program. In GP1, students provide a clear identification of a real-life problem that represents an actual need for the industry or the community and reflects the mission and strategic objective of CUFE. Students are expected to survey the related literature, collect, and interpret market data, and proposed an approach for the solution, using the engineering knowledge and skills acquired. The course is graded as Pass/Fail based upon a report/oral presentation stating the expected cost and required material, tools, and facilities as well as a timed list of deliverables. |              |               |         |          |     |      |          |          |       |
| CCES482 | Graduation Project-2  | 3            |               |         |          |     |      |          |          |       |
|         | Pre-requisites: CCES481 + AA APPROVAL   |              |               |         |          |     |      |          |          |       |
|         | Graduation Project-2 is the second phase of the graduation project. The aim is to develop innovative solutions to problems encountered during the implementation process thus fulfilling the deliverables stated in Graduation Project-1. A dissertation on the project is submitted taking into consideration technical, economic, social, and environmental requirements while analysing the major results and presenting direct conclusions.   |              |               |         |          |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

## BYLAWS 2023 Bachelor of Science Degree Credit Hours System



كلية الهندسة  
Faculty of  
Engineering

### PROGRAM REQUIREMENTS متطلبات البرنامج

The Communication and Computer Engineering Program is a new bachelor program based on the Credit Hours System under the joint umbrella of two scientific departments at the Faculty of Engineering, Cairo University: namely Electronics and Communication Department and Computer Engineering Department. Students who wish to pursue a bachelor's degree in communications and Computer Engineering have first to finish the discipline-core requirements. This should be followed by choosing one of the two internal tracks: communications engineering (CCE-E) or computer engineering (CCE-C) and finishing its associated major specialty requirements including all its compulsory and elective courses.

| Category                                    |                  | No. of courses | Course Credit Hour | Total Credit Hours |
|---|------------------|----------------|--------------------|--------------------|
| Discipline Requirements (DR)                | core/ compulsory | 21             | 3                  | 63                 |
|   |                  | 2              | 2                  | 4                  |
|   | Elective         | 0              | 3                  | 0                  |
|   |                  | 2              | 2                  | 4                  |
| <b>Total DR courses</b>                     |                  | <b>25</b>      |                    | <b>71</b>          |
| Program Requirement (PR)                    | core/ compulsory | 6              | 3                  | 18                 |
|   |                  | 0              | 2                  | 0                  |
|   | Elective         | 7              | 3                  | 21                 |
|   |                  | 0              | 2                  | 0                  |
| <b>Total PR courses</b>                     |                  | <b>38</b>      |                    | <b>110</b>         |
| <b>Total Elective courses (DR &amp; PR)</b> |                  | <b>9</b>       |                    | <b>25</b>          |



جامعة القاهرة  
Cairo  
University

## BYLAWS 2023 Bachelor of Science Degree Credit Hours System



كلية الهندسة  
Faculty of  
Engineering

### ▪ Discipline Requirements (DR) core/compulsory courses list

The discipline requirements of the CCE bachelor program consist of 67 credits (43.2% of total 155 credits), which are satisfied by completing twenty-three (23) courses. Six (6) of these courses are interdisciplinary courses (coded by EMP, MTH, PHY), which are equivalent to 18 credits (11.6%). All the discipline core courses are compulsory, and they are designed to provide the student with the electrical and computer engineering application.

| Code    | Name  | Credit Hours | Pre-requisite     |
|---------|---|--------------|-------------------|
| CMPS101 | Logic Design                                  | 3            | PHYS002 +MTHS004* |
| CMPS102 | Programming Techniques                        | 3            | INTS005           |
| CMPS103 | Data Structures and Algorithms                | 3            | CMPS102 + INTS005 |
| CMPS201 | Microprocessor Systems                        | 3            | CMPS101           |
| CMPS202 | Introduction to Database Management Systems   | 3            | CMPS102           |
| CMPS211 | Advanced Programming Techniques               | 2            | CMPS102           |
| CMPS301 | Computer Architecture                         | 3            | CMPS201+MTHS004   |
| CMPS303 | Operating Systems                             | 3            | CMPS102+ MTHS004  |
| CMPS405 | Computer Networks-1                           | 3            | CMPS103+CMPS201   |
| EECS100 | Laboratory                                    | 2            | EECS102 +CMPS101  |
| EECS101 | Electronics-1: Basic Electronic Circuits      | 3            | PHYS102+ EECS102  |
| EECS102 | Circuits-1                                    | 3            | MTHS003 + PHYS002 |
| EECS112 | Circuits-2                                    | 3            | EECS102 + MTHS102 |
| EECS201 | Electronics-2: Analog and Digital Electronics | 3            | EECS101+EECS304*  |
| EECS203 | Signal Analysis                               | 3            | EECS102 + MTHS102 |
| EECS304 | Control-1                                     | 3            | MTHS102 + EECS203 |
| EECS306 | Communications-1: Analogue Communications     | 3            | EECS203 + MTHS204 |
| EPES125 | Electrical Power Engineering                  | 3            | EECS102           |
| MTHS104 | Differential Equations                        | 3            | MTHS003           |
| MTHS004 | Discrete Mathematics                          | 3            | MTHS002*          |
| MTHS102 | Linear Algebra and Multivariable Integrals    | 3            | MTHS003           |
| MTHS114 | Numerical Analysis                            | 3            | MTHS102, MTHS104  |
| PHYS102 | Modern Physics                                | 3            | PHYS002           |

Remarks: (\*) co-requisite





جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

▪ **Discipline Requirements (DR) core/compulsory courses list (E TRACK)**

| Code    | Name  | Credit Hours | Pre-requisite     |
|---------|---|--------------|-------------------|
| EECS205 | Electromagnetics-1: Wave Propagation and Transmission Lines | 3            | PHYS211 +EECS112* |
| EECS301 | Electronics-3: Integrated Circuits and Systems              | 3            | EECS201           |
| EECS305 | Electromagnetics-2: Microwave Engineering                   | 3            | EECS205 + EECS112 |
| EECN404 | Control-2   | 4            | EECS304           |
| EECS316 | Communications-2: Digital Communications                    | 3            | EECS306           |
| PHYS211 | Electromagnetic Fields                                      | 3            | MTHS104           |

Remarks: (\*) co-requisite

▪ **Discipline Requirements (DR) core/compulsory courses list (C TRACK)**

| Code    | Name                                      | Credit Hours | Pre-requisite     |
|---------|---|--------------|-------------------|
| CMPS203 | Software Engineering                      | 3            | CMPS103           |
| CMPS302 | Algorithms Design & Analysis              | 3            | CMPS103           |
| CMPS403 | Languages & Compilers                     | 3            | CMPS303           |
| CMPS402 | Machine Intelligence                      | 3            | MTHS114 + MTHS204 |
| CMPS425 | Computer Consultation                     | 2            | 70 credits        |
| CMPS426 | Security of Computer Systems and Networks | 3            | CMPS202+CMPS405   |
| CMPS445 | Embedded Systems                          | 3            | CMPS201           |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

▪ **Discipline Requirements (DR) elective courses list (E TRACK)**

| Code    | Name   | Credit Hours | Group               | Pre-requisite            |
|---------|--|--------------|---------------------|--------------------------|
| EECS314 | Programmable Logical Controllers                         | 3            |                     | EECS304                  |
| EECS321 | VLSI Systems   | 3            |                     | EECS301                  |
| EECS323 | Digital Signal Processing                                | 3            |                     | EECS306                  |
| EECS331 | Advanced Topics in Electronics-1                         | 3            |                     | EECS201                  |
| EECS351 | Industrial Electronics                                   | 3            |                     | EECS201                  |
| EECS426 | Optical Fiber Communication                              | 3            |                     | EECS306 + EECS205        |
| EECS435 | Advanced Topics in Antennas                              | 3            |                     | EECS405                  |
| EECS436 | Mobile Communications                                    | 3            |                     | EECS316                  |
| EECS441 | Advanced Topics in Electronics-2                         | 3            |                     | EECS201                  |
| EECS445 | Advanced Topics in Microwave and RF Eng                  | 3            | E-2E <sup>(1)</sup> | EECS405                  |
| EECS446 | Advanced Topics in Communications-1                      | 3            |                     | EECS316                  |
| EECS451 | Advanced Topics in Electronics-3                         | 3            |                     | EECS301*                 |
| EECS456 | Advanced Topics in Communications-2                      | 3            |                     | EECS316*                 |
| EECS466 | Satellite Communications                                 | 3            |                     | EECS316                  |
| EECS476 | Advance Topics in Communications-3                       | 3            |                     | EECS316                  |
| EECS414 | Advanced topics in Control                               | 3            |                     | EECS304                  |
| EECS417 | Applications of embedded systems                         | 3            |                     | EECS304+CMPS201          |
| EECS418 | Applications in Communications using advanced techniques | 3            |                     | MTHS204+EECS316+EECN406* |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code    | Name   | Credit Hours | Group               | Pre-requisite           |
|---------|--|--------------|---------------------|-------------------------|
| EECS419 | PID single loop control                      | 3            |                     | EECS304                 |
| EECS420 | Machine Learning: Digital Design Perspective | 3            |                     | CMPS103+CMPS201+EECS201 |
| EECS325 | Acoustics                                    | 3            | E-2E <sup>(2)</sup> | EECS305                 |
| EECS405 | Antennas                                     | 3            |                     | EECS205 + EECS305*      |
| EECS406 | Wireless communications                      | 3            | E-2E <sup>(3)</sup> | EECS316                 |
| EECS416 | Applications of Information Theory           | 3            |                     | EECS306                 |

**There is a flexibility of One elective course (from CCEC track, E-2 C<sup>(1)</sup>) that can be taken so long as the pre-requisite of the course is fulfilled, i.e. Elective from CCEC track can be taken by students from CCEE track and viceversa.**

Remarks:

(1) Student selects at least five (5) courses from group E-2E<sup>(1)</sup> equivalent to 15 credits.

(2) Student selects at least one (1) course from group E-2E<sup>(2)</sup> equivalent to 3 credits.

(3) Student selects at least one (1) course from group E-2E<sup>(3)</sup> equivalent to 3 credits.

▪ **Discipline Requirements (DR) elective courses list (C TRACK)**

| Code    | Name  | Credit Hours | Group               | Pre-requisite |
|---------|---|--------------|---------------------|---------------|
| CMPS111 | Advanced Logic Design and Testing             | 2            | E-2C <sup>(1)</sup> | CMPS101       |
| CMPS205 | Computer Graphics and Man Machine Interfacing | 2            |                     | CMPS103       |
| CMPS206 | Multimedia                                    | 2            |                     | CMPS103       |
| CMPS341 | Information Technology and Advanced Language  | 3            |                     | 100 Hour      |
| CMPS342 | Computer Systems Programming                  | 3            |                     | 100 Hour      |
| CMPS343 | Computation and Programming Theory            | 3            |                     | CMPS302       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code    | Name  | Credit Hours | Group | Pre-requisite     |
|---------|---|--------------|-------|-------------------|
| CMPS344 | Data Science  | 3            |       | CMPS103 + MTHS114 |
| CMPS401 | Advanced Database Systems                           | 3            |       | CMPS202           |
| CMPS305 | Mobile and Web Application Development              | 3            |       | CMPS202           |
| CMPS406 | Wireless and Mobile Network                         | 3            |       | CMPS405           |
| CMPS407 | Computer Modeling and Simulations                   | 3            |       | CMPS101 + MTHS114 |
| CMPS415 | Computer Networks-2                                 | 3            |       | CMPS405           |
| CMPS441 | Computer Peripherals                                | 3            |       | CMPS301           |
| CMPS442 | Fault Tolerant Computing                            | 3            |       | MTHS114 + MTHS204 |
| CMPS443 | Computer Manufacturing Technology                   | 3            |       | CMPS301           |
| CMPS444 | Computer Interfacing                                | 3            |       | CMPS201+CMPS205   |
| CMPS446 | Image Processing and Computer Vision                | 3            |       | MTHS204           |
| CMPS447 | Optical Networks                                    | 3            |       | CMPS405           |
| CMPS448 | High Performance Computing and Parallel Programming | 3            |       | CMPS301 + CMPS302 |
| CMPS449 | Real Time Computers                                 | 3            |       | CMPS445           |
| CMPS450 | Pattern Recognition and Artificial Neural Networks  | 3            |       | CMPS102 + MTHS114 |
| CMPS451 | Data Mining, Big Data and Data Analytics            | 3            |       | MTHS204+ MTHS114  |
| CMPS452 | Advanced Cybersecurity                              | 3            |       | CMPS405           |
| CMPS453 | Cloud Computing                                     | 3            |       | CMPS405           |
| CMPS454 | Natural Language Processing                         | 3            |       | CMPS211 + MTHS114 |
| CMPS455 | Parallel Processing                                 | 3            |       | CMPS301 + CMPS302 |
| CMPS456 | Mobile robotics                                     | 3            |       | CMPS102 + MTHS204 |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code    | Name                                      | Credit Hours | Group               | Pre-requisite |
|---------|---|--------------|---------------------|---------------|
| CMPS461 | Selected Topics in Computer Engineering   | 3            |                     | 100 Hour      |
| CMPS462 | Selected Topics in Information Technology | 3            |                     | 100 Hour      |
| CMPS463 | Advanced Topics in Computer Engineering   | 3            |                     | 100 Hour      |
| EECS316 | Communications-2                          | 3            | E-2C <sup>(2)</sup> | EECS306       |
| EECS301 | Electronics-3                             | 3            |                     | EECS201       |

There is another flexibility of **One elective course** (from CCEE track, group E-2E<sup>(1)</sup>) that can be taken so long as the pre-requisite of the course is fulfilled, i.e. Elective from CCEE track can be taken by students from CCEC track and vice versa.

**Remarks:**

- (1) Student selects at least six (6) courses from group E-2C<sup>(1)</sup> equivalent to 18 credits.
- (2) Student selects at least one (1) course from group E-2C<sup>(2)</sup> equivalent to 3 credits.

Specialized Tracks of Engineering Profession



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

**Proposed Study Plan - 8 semesters - Including Freshman Level**

| S          | Code    | Name   | Credit Hours | Contact Hours |          |          |          |          |          |          | Total    |           |
|------------|---------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|----------|-----------|
|            |         |  |              | Lec           | Tut (2)  | App Tut  | Lab      | Stud     | Off Tut  | OffHr    |          |           |
| SEMESTER 1 | PHYS001 | Mechanical Properties of Matter and Thermodynamics | 3            | 2             |          | 2        | 1        |          |          |          |          | 5         |
|            | MTHS002 | Calculus I   | 3            | 2             | 2        |          |          |          |          |          |          | 4         |
|            | EMCS001 | Engineering Mechanics - Dynamics                   | 3            | 1             | 2        |          | 1        |          |          |          |          | 4         |
|            | CHES001 | Chemistry for Engineers                            | 2            | 1             | 2        |          |          |          |          |          |          | 3         |
|            | PHYS002 | Electricity and Magnetism                          | 3            | 2             |          | 2        | 1        |          |          |          |          | 5         |
|            | INTS005 | Information Technology                             | 2            | 1             |          |          | 3        |          |          |          |          | 4         |
|            | GENS004 | Proficiency and Capacity Building                  | 1            | 1             |          |          |          |          |          |          |          | 1         |
|            | GENS001 | Critical and Creative Thinking                     | 2            | 2             |          |          |          |          |          |          |          | 2         |
|            |         | <b>Sub-Total</b>                                   | <b>19</b>    | <b>13</b>     | <b>6</b> | <b>4</b> | <b>5</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |

| S          | Code          | Name   | Credit Hours | Contact Hours |          |          |          |          |          |          | Total    |           |
|------------|---------------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|----------|-----------|
|            |               |  |              | Lec           | Tut (2)  | App. Tut | Lab      | Stud     | Off Tut  | Off. Hrs |          |           |
| SEMESTER 2 | MTHS003       | Calculus 2                                     | 3            | 2             | 2        |          |          |          |          |          |          | 4         |
|            | EMCS002       | Engineering Mechanics - Statics                | 2            | 1             | 2        |          |          |          |          |          |          | 3         |
|            | INTS001       | Engineering Graphics                           | 3            | 2             |          |          |          | 3        |          |          |          | 5         |
|            | E-A (GENS005) | Elective E-A (Writing and Presentation Skills) | 2            | 2             |          |          |          |          |          |          |          | 2         |
|            | CMPS102       | Programming Techniques                         | 3            | 2             |          |          | 3        |          |          |          |          | 5         |
|            | MTHS004       | Discrete Math.                                 | 3            | 2             | 2        |          |          |          |          |          |          | 4         |
|            | PHYN102       | Modern Physics                                 | 3            | 2             | 0        | 2        | 1        |          |          |          |          | 5         |
|            |               | <b>Sub-Total</b>                               | <b>19</b>    | <b>13</b>     | <b>6</b> | <b>2</b> | <b>4</b> | <b>3</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

**COMMUNICATION TRACK (E)**

| S                | Code    | Name                                       | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |   |
|------------------|---------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|---|
|                  |         |  |              | Lec           | Tut (2)  | App Tut  | Lab      | Stud     | Off Tut  | OffHr    |           |   |
| SEMESTER 3       | CMPS101 | Logic Design                               | 3            | 2             |          |          | 3        |          |          |          |           | 5 |
|                  | CMPS103 | Data Structures & Algorithms               | 3            | 2             |          |          | 3        |          |          |          |           | 5 |
|                  | MTHS102 | Linear Algebra and Multivariable Integrals | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | EECS102 | Circuits 1                                 | 3            | 2             |          | 2        | 1        |          |          |          |           | 5 |
|                  | EPES125 | Electrical Power Engineering               | 3            | 1             |          | 3        |          |          |          |          |           | 4 |
|                  | MTHS104 | Differential Equations                     | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | CCES280 | Engineering Seminar                        | 1            | 1             |          |          |          |          |          |          |           | 1 |
| <b>Sub-Total</b> |         |  | <b>19</b>    | <b>12</b>     | <b>4</b> | <b>5</b> | <b>7</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |

| S                | Code          | Name   | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |   |
|------------------|---------------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|---|
|                  |               |  |              | Lec           | Tut (2)  | App. Tut | Lab      | Stud     | Off Tut  | Off. Hrs |           |   |
| SEMESTER 4       | E-A (GENS110) | Elective E-A (Fundamental of Management, Risk and Environment) | 2            | 2             |          |          |          |          |          |          |           | 2 |
|                  | EECS101       | Electronic-1: Basic Electronic Circuits                        | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | MTHS204       | Advanced Probability and Statistics                            | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | EECS203       | Signal Analysis  | 3            | 2             |          | 2        | 1        |          |          |          |           | 5 |
|                  | EECS100       | Laboratory   | 2            | 1             |          |          | 3        |          |          |          |           | 4 |
|                  | EECS112       | Circuits 2   | 3            | 2             |          | 2        | 1        |          |          |          |           | 5 |
|                  | PHYS211       | Electromagnetic Fields   | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
| <b>Sub-Total</b> |               |  | <b>19</b>    | <b>13</b>     | <b>6</b> | <b>4</b> | <b>5</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| S                | Code          | Name   | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |   |
|------------------|---------------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|---|
|                  |               |  |              | Lec           | Tut (2)  | App Tut  | Lab      | Stud     | Off Tut  | OffHr    |           |   |
| SEMESTER 5       | CMPS201       | Microprocessor Systems                           | 3            | 2             |          |          | 3        |          |          |          |           | 5 |
|                  | CMPS202       | Introduction to Database Management Systems      | 3            | 2             |          |          | 3        |          |          |          |           | 5 |
|                  | EECS306       | Communications-1: Analogue Communications        | 3            | 2             | 2        | 1        |          |          |          |          |           | 5 |
|                  | EECS304       | Control-1  | 3            | 2             | 2        | 1        |          |          |          |          |           | 5 |
|                  | GENS001       | UR ELECTIVE SELECTED TOPIC                       | 2            | 2             |          |          |          |          |          |          |           | 2 |
|                  | EECS205       | Electromagnetics-1                               | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | E-A (GENS120) | Elective E-A (Fund. of Economics and Accounting) | 2            | 2             |          |          |          |          |          |          |           | 2 |
| <b>Sub-Total</b> |               |  | <b>19</b>    | <b>14</b>     | <b>2</b> | <b>4</b> | <b>8</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |

| S                | Code    | Name  | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |   |
|------------------|---------|---|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|---|
|                  |         |   |              | Lec           | Tut (2)  | App. Tut | Lab      | Stud     | Off Tut  | Off. Hrs |           |   |
| SEMESTER 6       | CMPS211 | Advanced Programming Techniques               | 2            | 1             |          |          | 2        |          |          |          |           | 3 |
|                  | CMPS301 | Computer Architecture                         | 3            | 2             |          |          | 2        |          |          |          |           | 4 |
|                  | CMPS303 | Operating Systems                             | 3            | 2             |          |          | 3        |          |          |          |           | 5 |
|                  | EECS316 | Communications-2                              | 3            | 2             | 2        | 1        |          |          |          |          |           | 5 |
|                  | EECS305 | Electromagnetics-2                            | 3            | 2             | 2        | 1        |          |          |          |          |           | 5 |
|                  | EECS201 | Electronics-2: Analog and Digital Electronics | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|                  | GENS2XX | (UR) Free Elective                            | 2            | 2             |          |          |          |          |          |          |           | 2 |
| <b>Sub-Total</b> |         |   | <b>19</b>    | <b>13</b>     | <b>2</b> | <b>4</b> | <b>9</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |





جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| S          | Code    | Name               | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |   |
|------------|---------|--------------------|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|---|
|            |         |                    |              | Lec           | Tut (2)  | App Tut  | Lab      | Stud     | Off Tut  | OffHr    |           |   |
| SEMESTER 7 | CMPS405 | Computer Networks  | 3            | 2             |          |          | 2        |          |          |          |           | 4 |
|            | EECSXXX | Elective-1         | 3            | 2             |          | 2        |          |          |          |          |           | 4 |
|            | CCES481 | GP1                | 1            |               | 2        |          |          |          |          |          |           | 2 |
|            | EECSXXX | Elective-2         | 3            | 2             |          | 2        |          |          |          |          |           | 4 |
|            | EECSXXX | Elective-3         | 3            | 2             |          | 2        | 1        |          |          |          |           | 5 |
|            | EECS301 | Electronic-3       | 3            | 2             |          | 2        | 1        |          |          |          |           | 5 |
|            | MTHS114 | Numerical Analysis | 3            | 2             | 2        |          |          |          |          |          |           | 4 |
|            |         | <b>Sub-Total</b>   | <b>19</b>    | <b>12</b>     | <b>4</b> | <b>8</b> | <b>4</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |

| S          | Code    | Name             | Credit Hours | Contact Hours |          |           |          |          |          |          | Total     |   |
|------------|---------|------------------|--------------|---------------|----------|-----------|----------|----------|----------|----------|-----------|---|
|            |         |                  |              | Lec           | Tut (2)  | App. Tut  | Lab      | Stud     | Off Tut  | Off. Hrs |           |   |
| SEMESTER 8 | EECSXXX | Elective-4       | 3            | 2             |          | 2         |          |          |          |          |           | 4 |
|            | EECSXXX | Elective-5       | 3            | 2             |          | 2         | 1        |          |          |          |           | 5 |
|            | CCES482 | GP2              | 3            | 2             |          | 2         | 1        |          |          |          |           | 5 |
|            | EECS404 | Control-2        | 4            | 3             |          | 2         | 1        |          |          |          |           | 6 |
|            | EECSXXX | Elective-6       | 3            | 2             |          | 2         |          |          |          |          |           | 4 |
|            | EECSXXX | Elective-7       | 3            | 2             |          | 2         |          |          |          |          |           | 4 |
|            |         | <b>Sub-Total</b> | <b>19</b>    | <b>13</b>     | <b>0</b> | <b>12</b> | <b>3</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |   |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

**COMPUTER TRACK (C)**

| S                | Code    | Name   | Credit Hours | Contact Hours |          |          |           |          |          |          | Total     |
|------------------|---------|--|--------------|---------------|----------|----------|-----------|----------|----------|----------|-----------|
|                  |         |  |              | Lec           | Tut (2)  | App Tut  | Lab       | Stud     | Off Tut  | OffHr    |           |
| SEMESTER 3       | GENS110 | Fundamental of Mangement, Risk and Environment | 2            | 2             |          |          |           |          |          |          | 2         |
|                  | CMPS103 | Data Structures & Algorithms                   | 3            | 2             |          |          | 3         |          |          |          | 5         |
|                  | MTHS102 | Linear Algebra and Multivariable Integrals     | 3            | 2             | 2        |          |           |          |          |          | 4         |
|                  | CMPS303 | Operating Systems                              | 3            | 2             |          |          | 3         |          |          |          | 5         |
|                  | CMPS101 | Logic Design                                   | 3            | 2             |          |          | 3         |          |          |          | 5         |
|                  | EECS102 | Circuits 1                                     | 3            | 2             |          | 2        | 1         |          |          |          | 5         |
|                  | GENSXXX | UR ELECTIVE SELECTED TCPIC                     | 2            | 2             |          |          |           |          |          |          | 2         |
| <b>Sub-Total</b> |         |  | <b>19</b>    | <b>14</b>     | <b>2</b> | <b>2</b> | <b>10</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>28</b> |

| S                | Code    | Name   | Credit Hours | Contact Hours |          |          |          |          |          |          | Total     |
|------------------|---------|--|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|
|                  |         |  |              | Lec           | Tut (2)  | App. Tut | Lab      | Stud     | Off Tut  | Off. Hrs |           |
| SEMESTER 4       | GENS120 | Elective E-A (Fundamental of Economics and Accounting) | 2            | 2             |          |          |          |          |          |          | 2         |
|                  | MTHS104 | Differential Equations                                 | 3            | 2             | 2        |          |          |          |          |          | 4         |
|                  | EECS112 | Circuits 2   | 3            | 2             |          | 2        | 1        |          |          |          | 5         |
|                  | CMPS201 | Microprocessor Systems                                 | 3            | 2             |          |          | 3        |          |          |          | 5         |
|                  | CMPS211 | Advanced Programming Techniques                        | 2            | 1             |          |          | 2        |          |          |          | 3         |
|                  | EPES125 | Electrical Power Engineering                           | 3            | 1             |          | 3        |          |          |          |          | 4         |
|                  | EECS203 | Signals Analysis                                       | 3            | 2             |          | 2        | 1        |          |          |          | 5         |
| <b>Sub-Total</b> |         |  | <b>19</b>    | <b>12</b>     | <b>2</b> | <b>7</b> | <b>7</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| S          | Code             | Name  | Credit Hours | Contact Hours |          |          |          |          |          |          |           |
|------------|------------------|---|--------------|---------------|----------|----------|----------|----------|----------|----------|-----------|
|            |                  |   |              | Lec           | Tut (2)  | App Tut  | Lab      | Stud     | Off Tut  | OffHr    | Total     |
| SEMESTER 5 | MTHS114          | Numerical Analysis                          | 3            | 2             | 2        |          |          |          |          |          | 4         |
|            | CMPS202          | Introduction to Database Management Systems | 3            | 2             |          |          | 3        |          |          |          | 5         |
|            | MTHS204          | Advanced Probability and Statistics         | 3            | 2             | 2        |          |          |          |          |          | 4         |
|            | CMPSXX           | Elective - 1                                | 2            | 1             |          |          | 2        |          |          |          | 3         |
|            | EECS304          | Control-1                                   | 3            | 2             |          | 2        | 1        |          |          |          | 5         |
|            | CMPS302          | Algorithms Design & Analysis                | 3            | 2             |          |          | 3        |          |          |          | 5         |
|            | CMPS425          | Computer Consultation                       | 2            | 2             |          |          |          |          |          |          | 2         |
|            | <b>Sub-Total</b> |   | <b>19</b>    | <b>13</b>     | <b>2</b> | <b>2</b> | <b>9</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |

| S          | Code             | Name                                    | Credit Hours | Contact Hours |          |          |           |          |          |          |           |
|------------|------------------|---|--------------|---------------|----------|----------|-----------|----------|----------|----------|-----------|
|            |                  |   |              | Lec           | Tut (2)  | App. Tut | Lab       | Stud     | Off Tut  | Off. Hrs | Total     |
| SEMESTER 6 | CMPS301          | Computer Architecture                   | 3            | 2             |          |          | 2         |          |          |          | 4         |
|            | CMPS405          | Computer Networks                       | 3            | 2             |          |          | 2         |          |          |          | 4         |
|            | CMPS203          | Software Engineering                    | 3            | 2             |          |          | 3         |          |          |          | 5         |
|            | EECS100          | Lab                                     | 2            | 1             |          |          | 3         |          |          |          | 4         |
|            | CMPS445          | Embedded Systems                        | 3            | 2             |          |          | 3         |          |          |          | 5         |
|            | GENS2XX          | (UR) ELECTIVE                           | 2            | 2             |          |          |           |          |          |          | 2         |
|            | EECS101          | Electronic-1: Basic Electronic Circuits | 3            | 2             | 2        |          |           |          |          |          | 4         |
|            | <b>Sub-Total</b> |   | <b>19</b>    | <b>14</b>     | <b>2</b> | <b>0</b> | <b>13</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| S                | Code    | Name  | Credit Hours | Contact Hours |          |          |           |          |          |          |           |
|------------------|---------|---|--------------|---------------|----------|----------|-----------|----------|----------|----------|-----------|
|                  |         |   |              | Lec           | Tut (2)  | App Tut  | Lab       | Stud     | Off Tut  | OffHr    | Total     |
| SEMESTER 7       | CMPSXXX | Elective-2                                    | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | EECS306 | Communications-1: Analogue Communications     | 3            | 2             |          | 2        | 1         |          |          |          | 5         |
|                  | CMPS426 | Security of Computer Systems and Networks     | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | EECS201 | Electronics-2: Analog and Digital Electronics | 3            | 2             | 2        |          |           |          |          |          | 4         |
|                  | CCES481 | GP-1  | 1            | 2             |          |          |           |          |          |          | 2         |
|                  | CMPSXXX | Elective-3                                    | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | CMPS402 | Machine Intelligence                          | 3            | 2             |          |          | 3         |          |          |          | 5         |
| <b>Sub-Total</b> |         |   | <b>19</b>    | <b>14</b>     | <b>2</b> | <b>2</b> | <b>10</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |

| S                | Code    | Name                 | Credit Hours | Contact Hours |          |          |           |          |          |          |           |
|------------------|---------|----------------------|--------------|---------------|----------|----------|-----------|----------|----------|----------|-----------|
|                  |         |                      |              | Lec           | Tut (2)  | App. Tut | Lab       | Stud     | Off Tut  | Off. Hrs | Total     |
| SEMESTER 8       | EECSXXX | E- Elective 6        | 3            | 2             |          | 2        | 1         |          |          |          | 5         |
|                  | CCES280 | Seminar - 1          | 1            | 1             |          |          |           |          |          |          | 1         |
|                  | CMPS403 | Language & Compilers | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | CMPSXXX | Elective - 4         | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | CMPSXXX | Elective - 5         | 3            | 2             |          |          | 2         |          |          |          | 4         |
|                  | CMPSXXX | Elective - 7         | 3            | 2             |          |          | 3         |          |          |          | 5         |
|                  | CCES482 | GP-2                 | 3            | 2             |          |          | 3         |          |          |          | 5         |
| <b>Sub-Total</b> |         |                      | <b>19</b>    | <b>13</b>     | <b>0</b> | <b>2</b> | <b>13</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>28</b> |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

توصيف المقررات **COURSES CONTENTS**

| Code                           | Name/Content  | Credit Hours | Contact Hours |         |         |     |      |          |          | Total |
|--------------------------------|---|--------------|---------------|---------|---------|-----|------|----------|----------|-------|
|                                |   |              | Lec           | Tut (2) | App Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| <b>Discipline Requirements</b> |   |              |               |         |         |     |      |          |          |       |
| CMPS101                        | Logic Design  | 3            | 2             |         |         | 3   |      |          |          | 5     |
|                                | Pre-requisites: PHYS002, Co-requisite: MTHS004*   |              |               |         |         |     |      |          |          |       |
|                                | Data representation, Axiomatic definition of Boolean algebra, Canonical & standard forms, Karnaugh maps, NAND and NOR gates, exclusive-OR gates, integrated circuits, combinational circuits, decoders, encoders, multiplexers, adders, subtractors, multipliers, sequential circuits, latches, flip-flops, sequential circuits analysis, registers, counters, using finite state machines "FSM" methodology in sequential logic, Mealy & Moore models for FSM, RAM and ROM memories, programmable logic arrays (PLA, PLD, CPLD, FPGA). |              |               |         |         |     |      |          |          |       |
| References                     | Digital Design, 6th Edition by Morris Mano, Michael Ciletti, 2018   |              |               |         |         |     |      |          |          |       |
| CMPS102                        | Programming Techniques  | 3            | 2             |         |         | 3   |      |          |          | 5     |
|                                | Pre-requisites: INTS005   |              |               |         |         |     |      |          |          |       |
|                                | Fundamental design principles of modularity and abstraction in software programming using object-oriented programming language like C++, Java, etc. Basics of Object-Oriented Programming - Comparing Object-Oriented Design vs Procedural Design. OOP Covers Encapsulation, Classes and Objects, Interfaces and Abstractions, Inheritance, Virtual Functions, Abstract Classes, Polymorphism, Overloading, Object-oriented design patterns and SOLID Principles of Object-Oriented Design.   |              |               |         |         |     |      |          |          |       |
| References                     | <ul style="list-style-type: none"> <li>- Brett, M., Pollice Gary, and West David. "Headfirst Object-Oriented Analysis and Design." O'Reilly (2006).</li> <li>- Weisfeld, Matt. The object-oriented thought process. Pearson Education, 2008.</li> </ul>   |              |               |         |         |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |         |     |      |          |          | Total |
|------------|---|--------------|---------------|---------|---------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| CMPS103    | Data Structures and Algorithms  | 3            | 2             |         |         | 3   |      |          |          | 5     |
|            | Pre-requisites: CMPS102+INTS005   |              |               |         |         |     |      |          |          |       |
|            | Data types and representation – file structures- data structures representation in storage media and memory allocation- linear lists -stacks - queues - memory allocation - trees - graphs - Hashing -searching, sorting algorithms and their analysis-programming project  |              |               |         |         |     |      |          |          |       |
| References | * Data Abstraction & Problem Solving with C++<br>Walls and Mirrors, By Frank M. Carrano, 6th edition, Pearson International Edition, Addison Wesley, Copyright © 2013<br>* Data Structures, A Pseudocode Approach in C<br>By Richard F. Gilberg & Behrouz A. Forouzan, second edition Thomson Course Technology 2005, 2007 and later editions   |              |               |         |         |     |      |          |          |       |
| CMPS201    | Microprocessor Systems  | 3            | 2             |         |         | 3   |      |          |          | 5     |
|            | Pre-requisites: CMPS101   |              |               |         |         |     |      |          |          |       |
|            | Computer architecture - CPU architecture - fetch-decode-execute cycle - addressing modes - instruction set - memories (FAM-ROM-Cache-Flash) - memory interfacing - timing diagrams - assembly language - instruction formats - data representation - arithmetic operations -I/O ports - serial/ parallel ports programming  |              |               |         |         |     |      |          |          |       |
| References | 1- The x86 PC: Assembly Language, Design, and Interfacing 5th Edition (volume one) by Muhammad Ali Mazidi, Janice Gillispie Mazidi, Danny Causey Publisher: Prentice Hall; 5th edition (June 15, 2009) ISBN-10: -ISBN-13 0135026482 0135026489-978<br>The Intel Microprocessors (8th Edition) by Barry B. Brey Publisher -2Pearson; 8th edition (June 28, 2008) ISBN-10 0-35026458 ISBN-13 978-0135026458 |              |               |         |         |     |      |          |          |       |
| CMPS202    | Introduction to Database Management Systems   | 3            | 2             |         |         | 3   |      |          |          | 5     |
|            | Pre-requisites: CMPS102   |              |               |         |         |     |      |          |          |       |
|            | Basic database concepts - data structures and operations - data modeling - database system architecture - data definition and data manipulation languages - query languages including Algebra and SQL - software package training   |              |               |         |         |     |      |          |          |       |
| References | -Fundamentals of Database Systems, 7th edition. Pearson Education, 2016<br>-C# Programming: From Problem Analysis to Program Design. Cengage Learning, 2013.  |              |               |         |         |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |         |     |      |          |          | Total |
|------------|---|--------------|---------------|---------|---------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| CMPS211    | Advanced Programming Techniques   | 2            | 1             |         |         | 2   |      |          |          | 4     |
|            | Pre-requisites: CMPS102   |              |               |         |         |     |      |          |          |       |
|            | Introduction to software design - evolution and comparison of programming languages - types and characteristics of translators - structured programming - function versus object-oriented programming- introduction to distributed and parallel programming- program maintenance & testing - documentation - numerical and non-numerical examples- programming project. New and advanced programming Languages.   |              |               |         |         |     |      |          |          |       |
| References | <ul style="list-style-type: none"> <li>- Martin, Robert C. Clean code: a handbook of agile software craftsmanship. Pearson Education, 2009.</li> <li>- Programming and Problem Solving with C++: Comprehensive 6th Edition. Jones &amp; Bartlett Learning, 2016.</li> <li>- Programming: principles and practice using C++, 2nd edition. Pearson Education, 2014.</li> </ul>  |              |               |         |         |     |      |          |          |       |
| CMPS301    | Computer Architecture   | 3            | 2             |         |         | 2   |      |          |          | 4     |
|            | Pre-requisites: CMPS201+MTHS004   |              |               |         |         |     |      |          |          |       |
|            | Computer arithmetic - design of ALU - pipelined ALU and processor –multiprocessors - multicomputers control unit - instruction repertoires (RISC, CISC) - interrupt circuits - bus synchronization - I/O devices - channels - memory architectures - connection of computer peripherals - Distributed Systems- parallel processors architecture - scalable computer platforms - vector processors - vectorizing compilers - systolic arrays - loosely and tightly coupled processors - symmetric and CC-NUMA multiprocessors- data flow machines - interconnecting networks - clustering - parallel programming - performance evaluation - case studies |              |               |         |         |     |      |          |          |       |
| References | Computer Organization and Design MIPS Edition: The Hardware/Software Interface. 5th edition, David A. Patterson, John L. Hennessy, 2013   |              |               |         |         |     |      |          |          |       |
| CMPS303    | Operating Systems   | 3            | 2             |         |         | 3   |      |          |          | 5     |
|            | Pre-requisites: CMPS102+MTHS004   |              |               |         |         |     |      |          |          |       |
|            | Types of operating systems - functions of operating systems - process states - memory management - virtual memory - processor management - process scheduling - case study (Unix)- Real Time Operating systems- Multithreading. Multiprocessor systems - device management - deadlock prevention - file systems - system resilience - network and distributed operating systems - programming project.  |              |               |         |         |     |      |          |          |       |
| References |   |              |               |         |         |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |         |     |      |          |          | Total |   |
|------------|--|--------------|---------------|---------|---------|-----|------|----------|----------|-------|---|
|            |  |              | Lec           | Tut (2) | App Tut | Lab | Stud | Off. Tut | Off. Hrs |       |   |
| CMPS405    | Computer Networks-1<br>Pre-requisites: CMPS103+CMPS201<br>Seven-layer communication model - network architecture and protocols routing techniques and algorithms - network planning and design - Network layers, TCP / IP Network protocol, Routing protocols, Network Design, Network Management, Congestion, Examples of LAN's and WAN's, High Speed Networks, Other Network Protocols.    | 3            | 2             |         |         |     | 2    |          |          |       | 4 |
| References | Computer Networks (5th Edition) 5th Edition by Andrew Tanenbaum, David Wetherall, 2020   |              |               |         |         |     |      |          |          |       |   |
| EECS100    | Laboratory<br>Pre-requisites: EECS102 +CMPS101<br>Measurements Errors - Oscilloscopes- Digital Multi-meter - Frequency Meter - Digital Counters<br>Introduction about using electronic equipments (A.C. and D.C. power supplies, oscilloscopes), filter circuits, half wave and full wave rectifier circuits, oscillators, logic gates, counters.  | 2            | 1             |         |         |     | 3    |          |          |       | 4 |
| References | [1] Larry D. Jones / A. Foster Chin, "Electronic Instruments and Measurements ", Second Edition, Prentice Hall, 1991.<br>[2] David A. Bell, "Electronic Instrumentation and Measurements", Prentice-Hall, @2013  |              |               |         |         |     |      |          |          |       |   |
| EECS101    | Electronics-1: Basic Electronic Circuits<br>Pre-requisites: PHYS102+ EECS102<br>Diode circuit applications – Bipolar junction transistor (BJT) - Metal oxide semiconductor transistor (MOST): physical structure, basic configuration, I-V characteristics, biasing - small signal equivalent circuit - Biasing techniques (current source biasing) – Single stage amplifiers – Active Load. | 3            | 2             | 2       |         |     |      |          |          |       | 4 |
| References | 1. Behzad Razvi, "Fundamentals of Microelectronics", 3rd Edition, 2021, Wiley.<br>2. Sedra and Smith, "Microelectronic Circuits", 8th edition, 2019, Oxford University Press.  |              |               |         |         |     |      |          |          |       |   |





جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS102    | Circuits 1   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: MTHS003 + PHYS002  |              |               |         |           |     |      |          |          |       |
|            | Analysis of resistive circuits by simplifications – Network theorems – Analysis of circuits with AC excitation in the time domain – Analysis of AC circuits in the frequency domain – Analysis of AC circuits using circuit theorems, loop and node analysis – Maximum power transfer – RLC circuits – Magnetically coupled circuits - Three phase circuits. |              |               |         |           |     |      |          |          |       |
| References | C. Alexander and M. Sadiku, Fundamental of Electric Circuits, 7 <sup>th</sup> edition, Mc Graw Hill, 2021.<br>J. W. Nilson, and S.A. Riedel, Electric Circuits, 11 <sup>th</sup> Edition, Pearson Education Limited, 2020.   |              |               |         |           |     |      |          |          |       |
| EECS112    | Circuits 2   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS102 + MTHS102  |              |               |         |           |     |      |          |          |       |
|            | Series and parallel resonant circuits – Application on passive filters – Two port circuits – Fourier and harmonic analysis – Application of Laplace transforms to circuit analysis – Circuit synthesis – Synthesis of lossless Circuits  |              |               |         |           |     |      |          |          |       |
| References | "Fundamentals of Electric Circuits", Alexander and Sadiku, 7th edition, 2020, McGraw Hill.   |              |               |         |           |     |      |          |          |       |
| EECS201    | Electronics-2: Analog and Digital Electronics  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: EECS101+EECS304*   |              |               |         |           |     |      |          |          |       |
|            | *Corequisite course, both courses may be taken in the same semester after receiving the academic approval AA   |              |               |         |           |     |      |          |          |       |
|            | Multistage amplifiers and composite circuits - Current mirrors – High frequency analysis and frequency response – Differential amplifiers - Feedback amplifiers - Digital logic gates – Sequential circuits (flip-flops, shift registers, counters) – Power amplifiers   |              |               |         |           |     |      |          |          |       |
| References | 1. Behzad Razvi, "Fundamentals of Microelectronics", 3rd Edition, 2021, Wiley.<br>2. Sedra and Smith, "Microelectronic Circuits", 8th edition, 2019, Oxford University Press   |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS203    | Signal Analysis  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS102 + MTHS102  |              |               |         |           |     |      |          |          |       |
|            | Continuous time and discrete time signals and systems - basic system properties - Linear Time Invariant Systems – The C.T and D.T. convolution - Properties of LTI systems - Fourier Series Representation of C.T. and D.T. Periodic Signals - Parseval's relation - The C.T. Fourier Transform for periodic and aperiodic signals - Properties of continuous time F.T. – The D.T. Fourier Transform – Properties of D.T. Fourier Transform - Complex exponential and sinusoidal Amplitude Modulation-Demodulation for Sinusoidal AM - Frequency Division Multiplexing - Representation of continuous time signal by its samples - The sampling Theorem - The effect of under-sampling or aliasing - sampling with zero order hold - The Z Transform |              |               |         |           |     |      |          |          |       |
| References | A. V. Oppenheim, A. S. Willsky, and A.H. Nawab, "Signals and Systems", 2 <sup>nd</sup> edition, Pearson Education Limited, 2014.<br>Luis Chaparro, and Aydin Akan, Signals and Systems Using MATLAB, 3 <sup>rd</sup> Edition, Academic Press, Nov. 2018.   |              |               |         |           |     |      |          |          |       |
| EECS304    | Control-1  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: MTHS102 + EECS203  |              |               |         |           |     |      |          |          |       |
|            | Continuous-time linear systems approach – Classification of different continuous-time control systems – Mathematical modeling of dynamic systems using Laplace Transform– Application to electrical, electronic, mechanical, fluid systems – Feedback control systems – Control system characteristics – Error analysis – Steady state error for the test input signal using static error coefficients – Transient response characteristics – Approximation of higher order systems to second order systems – Basic control actions– Compensation using P,PI,PD and PID controllers – Block diagram reduction – Analysis of systems in state space – Stability of linear systems –Controllability – Observability                                    |              |               |         |           |     |      |          |          |       |
| References | Modern Control Engineering: by K Oçata, Pearson Education, fifth edition, 2010.  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS306    | Communications-1:<br>Analogue<br>Communications  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS203 + MTHS204  |              |               |         |           |     |      |          |          |       |
|            | All Types of AM ( DSB-LC, DSB-SC, SSB, VSB, QAM) – AM modulators, and demodulators, advantages and disadvantages-Synchronization circuits - AM applications: Telephone channel multiplexing and superheterodyne receiver -Angle Modulation - Narrow band angle modulated signals - Spectrum of sinusoidal signal (N.B and W.B) - Generation of wide band FM ( Indirect and Direct methods)-Demodulation (slope detector, PLL ) - De-emphasis and pre-emphasis filtering -compatible stereo - Intersystem comparison – Sampling process – PAM – Quantization (uniform and non-uniform) – PCM – Time division multiplexing – Delta, and adaptive delta modulation – Differential PCM – random process – Stationary and ergodic processes – Mean, correlation, and covariance functions – Power spectral density – Narrow band noise. |              |               |         |           |     |      |          |          |       |
| References | B. Lathi, Modern Digital and Analog Communication (The Oxford Series in Electrical and Computer Engineering) 5th Edition, 2018, Oxford University Press  |              |               |         |           |     |      |          |          |       |
| EPES125    | Electrical Power<br>Engineering  | 3            | 1             |         | 3         |     |      |          |          | 4     |
|            | Pre-requisites: EECS102  |              |               |         |           |     |      |          |          |       |
|            | Transformers – DC machines – AC machines – synchronous machines – special electrical machines (stepper motors, fixed magnet machines, two-phase servo motors) – electronic control of electrical machines –UPS systems – power distribution networks –air-conditioning- earthing – protection of electric equipment.   |              |               |         |           |     |      |          |          |       |
| References | P.C. Sen, Principles of Electric Machines and Power Electronics, Wiley, 3rd edition, September 2013  |              |               |         |           |     |      |          |          |       |
| MTHS104    | Differential Equations   | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: MTHS003  |              |               |         |           |     |      |          |          |       |
|            | First-order differential equations, separable, exact, linear, homogeneous and Bernoulli equations; modeling with first order differential equations; higher-order differential equations; method of undetermined coefficients; variation of parameters; modeling with higher order differential equations; series solutions; Laplace transform; properties and applications, shifting theorems, convolution theorem; solutions of differential equations using Laplace transform; Fourier series; Fourier transform.   |              |               |         |           |     |      |          |          |       |
| References | 1- A First Course in Differential Equations with Modeling Applications, 11th Edition 2017, by Dennis G. Zill<br>2- Fundamentals of Differential Equations, 9th Edition, 2017, by R. Nagle , Edward Saff , Arthur Snider  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| MTHS004    | Discrete Mathematics  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: MTHS002 *   |              |               |         |           |     |      |          |          |       |
|            | *Corequisite course, both courses may be taken in the same semester after receiving the academic approval AA  |              |               |         |           |     |      |          |          |       |
|            | Propositional Logic- First-Order Predicate Logic-Proof Techniques-Fundamentals of Set Theory-Relations-Functions -Complexity- An Introduction to Number Theory-Mathematical Induction- Introduction to Combinatorics-Permutations and Combinations-Introduction to Graph Theory-Introduction to Languages and Automata.   |              |               |         |           |     |      |          |          |       |
| References | Rosen, K. (2011). Discrete Mathematics and Its Applications (7th edition). McGraw Hill  |              |               |         |           |     |      |          |          |       |
| MTHS102    | Linear Algebra and Multivariable Integrals  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: MTHS003   |              |               |         |           |     |      |          |          |       |
|            | Solving Linear Systems, Vector Spaces and Subspaces, Inner Product Spaces and Orthonormal Bases, The Eigenvalue Problem, Diagonalization of Matrices, Computing Functions of Matrices. Functions of Several Variables, The Gradient of a Scalar Function and its Applications, Vector Fields, Curl and Divergence, Double and Triple Integrals with Applications, Line and Surface Integrals with Applications.   |              |               |         |           |     |      |          |          |       |
| References | -Calculus Early Transcendentals", by J. Stewart, 8th edition, 2015, Cengage Learning<br>- Elementary Linear Algebra with Applications" by B. Kolman and D. Hill, 2013, Pearson.   |              |               |         |           |     |      |          |          |       |
| MTHS114    | Numerical Analysis  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: MTHS102 + MTHS104   |              |               |         |           |     |      |          |          |       |
|            | Types of Errors. Linear systems: direct methods (Gauss elimination, Choleski) – Iterative methods (Gauss-Seidel, SOR, etc..). Approximation of Functions: polynomials and piecewise polynomial interpolation, splines. Discrete Least Squares Approximation. Nonlinear equations (Newton's method and its discrete variants, fixed point iteration). Power Method and Power method with Deflation to solve the Eigen Value problem. Numerical integration (Newton- Cotes formulas, Gaussian quadrature rules, composite rules). Initial value problems for ordinary differential equation: one-step methods (Runge-Kutta method) and multistep predictor corrector methods (Adams, Milne, etc ..). Stiff problems. Solution of Partial Differential Equations using finite difference method. |              |               |         |           |     |      |          |          |       |
| References | Numerical Methods for Engineers, Seventh edition, by Steven C. Chapra and Raymond P. Canale. Publisher: McGraw Hill.2014  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code   | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|--|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|  |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| PHYS102  | Modern Physics  | 3            | 2             | 0       | 2         | 1   |      |          |          | 5     |
|  | Pre-requisites: PHYS002   |              |               |         |           |     |      |          |          |       |
|  | Introduction to relativistic mechanics - Introduction to quantum mechanics - The Schrodinger Equation and some of its applications - Atomic Physics - Molecules and solids - Energy states - Bonding in solids, introduction to crystalline properties and Miller indices - Band theory of solids - Metals, insulators and semiconductors - Electrical conduction in metals and semiconductors - Introduction to some electronic devices.                     |              |               |         |           |     |      |          |          |       |
| References   | Modern Physics for Scientists and Engineers", Stephen Thornton, Andrew Rex, 4 <sup>th</sup> edition, Cengage Learning, 2013. ISBN: 978-1-133-10372-1  |              |               |         |           |     |      |          |          |       |
| <b>Program Requirement (Compulsory) CCEE Track</b> |   |              |               |         |           |     |      |          |          |       |
| EECS205  | Electromagnetics-1: Wave Propagation and Transmission Lines   | 3            | 2             | 2       |           |     |      |          |          | 4     |
|  | Pre-requisites: PHYS211 +EECS112"   |              |               |         |           |     |      |          |          |       |
|  | *Corequisite course, both courses may be taken in the same semester after receiving the academic approval AA  |              |               |         |           |     |      |          |          |       |
|  | Time varying fields and Maxwell's equations, boundary conditions at different media interface, retarded potentials, plane wave propagation in free space, plane waves in lossy media, wave polarization, Poynting vector, phase and group velocities, reflection and transmission of plane waves, TEM transmission lines, transmission line equivalent circuit, transmission line circuit theory, Smith chart, lossy transmission lines, matching techniques. |              |               |         |           |     |      |          |          |       |
| References   | 1- David K. Cheng, "Field and Wave Electromagnetics" Second Edition. Addison-Wesley, 1989<br>2- H.C Verma, "Classical Electromagnetism", First Edition, Bharati Bhawan (Publishers & Distributors), 2022<br>3- Stuart M. Wentworth, "Fundamentals of Electromagnetics with Engineering Applications". John Wiley, 2005  |              |               |         |           |     |      |          |          |       |
| EECS301  | Electronics-3: Integrated Circuits and Systems  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|  | Pre-requisites: EECS201   |              |               |         |           |     |      |          |          |       |
|  | IC technology – Tuned amplifiers – Noise analysis – Operational amplifiers and applications – Waveform generation – Analog IC applications (analysis and design) – Evaluation of circuit performance by computer-aided circuit simulations – Phase locked loops - Electronic circuits in radio and television – Video recording .   |              |               |         |           |     |      |          |          |       |
| References   | 1. Behzad Razvi, "Fundamentals of Microelectronics", 3rd Edition, 2021, Wiley.<br>2. Sedra and Smith, "Microelectronic Circuits", 8th edition, 2019, Oxford University Press  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS305    | Electromagnetics-2:<br>Microwave Engineering  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS205 + EECS112   |              |               |         |           |     |      |          |          |       |
|            | Rectangular and circular wave guides, cavity resonators, excitation of waveguides, surface guiding and dielectric optical waveguides, analysis of microstrip and strip lines, scattering parameters, wave propagation in ferrite media, passive microwave components.   |              |               |         |           |     |      |          |          |       |
| References | David Pozar, Microwave Engineering 4th Edition, 2011, Wiley   |              |               |         |           |     |      |          |          |       |
| EECS404    | Control-2   | 4            | 3             |         | 2         | 1   |      |          |          | 6     |
|            | Pre-requisites: EECS304   |              |               |         |           |     |      |          |          |       |
|            | Root locus concept – Root locus analysis of control systems – Frequency response analysis – Bode diagrams – Frequency response specifications – Relative Stability analysis – closed loop frequency response – Design and compensation techniques – Lead and Lag compensation – Solution of State Equations - State variable controller design: Regulator problem – Pole placement using state feedback – Output feedback – Full State Observer Design – Separation Principle – Observed State feedback Controller – Discrete-Time Control Systems – Z-Transform – Pulse-Transfer Functions – Transient Response and Steady State Characteristics of Discrete-time control systems – Bilinear transformation – Stability analysis of discrete-time control systems. |              |               |         |           |     |      |          |          |       |
| References | 1. Modern Control Engineering: by K Ogata, Pearson Education, fifth edition, 2010<br>2. Feedback Control Systems, L. Philips & R. D. Harbor, Pearson, 2011,<br>3. Digital Control Engineering- Analysis and Design, M. Sam Fadali, Elsevier, 2009   |              |               |         |           |     |      |          |          |       |
| EECS316    | Communications-2:<br>Digital Communications   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS306   |              |               |         |           |     |      |          |          |       |
|            | Baseband Pulse transmission: Matched filters, Intersymbol Interference, Nyquist Criterion for distortionless baseband binary transmission - Signal-Space Analysis: Geometric representation of signals, likelihood functions, coherent detection of signals in noise: ML and MAP decoding rules, the correlation receiver. Probability of error calculation – Pass-band Digital Transmission: Description of ASK, FSK, PSK, DPSK, QAM, MSK modulation schemes - their implementation PSD $\nu/c_s$ - B.W efficiency (spectral efficiency) - performance in AWGN channels.   |              |               |         |           |     |      |          |          |       |
| References | 1. Sunil Bhooshan, "Fundamentals of Analogue and Digital Communication Systems," Springer, 2021. ISBN 10: 9811642761 ISBN 13: 9789811642760<br>2. B. Lathi, Modern Digital and Analog Communication (The Oxford Series in Electrical and Computer Engineering) 5th Edition, 2018, Oxford University Press   |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code   | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|--|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|  |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| PHYS211  | Electromagnetic Fields<br>Pre-requisites: MTHS104<br>Vector analysis, static electric field, steady currents, electromagnetic fields. static magnetic fields, time varying and time harmonic Maxwell's equations, wave equation and its solutions, boundary conditions, introduction to electromagnetic wave propagation   | 3            | 2             | 2       |           |     |      |          |          | 4     |
| References                                       | David K. Cheng, "Field and Wave Electromagnetics," Second edition, Addison Wesley, 1989  |              |               |         |           |     |      |          |          |       |
| <b>Program Requirement (Elective) CCEE Track</b> |  |              |               |         |           |     |      |          |          |       |
| EECS314  | Programmable Logic Controllers<br>Pre-requisites: EECS304<br>Modular structure of Programmable Logic Controllers (PLCs) – Advantages of using PLCs in Industrial Automation – PLC Programming – Ladder Logic – Handling of Inputs and Outputs in PLCs – Markers - Timers - Counters – PLC Program Development for Control Applications – Interlocking Logic – Sequential Logic - | 3            | 2             | 2       | 1         |     |      |          |          | 5     |
| References                                       | Programmable Logic Controllers, 6 <sup>th</sup> edition, 2015, by William Bolton   |              |               |         |           |     |      |          |          |       |
| EECS321  | VLSI Systems<br>Pre-requisites:<br>Large scale MOS design – MOS circuit fabrication, design rules, power and delay estimation – Memories – Dynamic logic – Switching characteristics – Switched capacitor circuits – Complex gates – Charge coupled devices.   | 3            | 2             | 2       | 1         |     |      |          |          | 5     |
| References                                       | 1- Rabaey, Chandrakasan, and Nikolic, "Digital Integrated Circuits-A Design Perspective Introduction", 2nd Edition, 2003, Pearson.   |              |               |         |           |     |      |          |          |       |
| EECS323  | Digital Signal Processing<br>Pre-requisites: EECS306<br>General Introduction - Speech Characteristics - Short time Processing - Pitch & Formants Estimation - Vector Quantization - Linear Predictive Coding - speech Coding Techniques - Speech Synthesis - Speech Recognition - Speaker Recognition - Image Coding - Video Coding - Review Projects.                           | 3            | 2             | 2       | 3         |     |      |          |          | 5     |
| References                                       | Digital Speech Processing Synthesis and Recognition, by Sadaoki Furui, Second edition, CRC Press, 2018<br>Digital Processing of Speech Signals, US Edition by Lawrence Rabiner, Pearson, 2008  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS331    | Advanced Topics in Electronics-1   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS201  |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in electronic systems and applications.   |              |               |         |           |     |      |          |          |       |
| References | NA   |              |               |         |           |     |      |          |          |       |
| EECS351    | Industrial Electronics   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS201  |              |               |         |           |     |      |          |          |       |
|            | Data acquisition systems – Sensors – Signal Conditioning – Digitizing – Microprocessor based systems – Memory interface – I/O interfaces – Applications in industry.   |              |               |         |           |     |      |          |          |       |
| References | 1. Handbook of Digital CMOS Technology, Circuits, and Systems. Springer Nature, 2020. K Abbas<br>2. Analogue Electronics for Microcomputer Systems; Paul F. Goldsrough, Trevor Lund, John P. Rayner, 1983<br>3. Microprocessors with Applications in Process Control; S. I. Ahson, 1985  |              |               |         |           |     |      |          |          |       |
| EECS426    | Optical Fiber Communication  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS306 + EECS205  |              |               |         |           |     |      |          |          |       |
|            | Optical versus radio frequency communications – Optical fibers – Ray representation in optical fibers – Model analysis in step and graded index optical fibers – Signal degradation – Optical receivers – Optical properties of III – V semiconductors – Emitters: SC laser diodes, light emitting diodes – Photo detectors PIN and avalanche photo diode (APD).   |              |               |         |           |     |      |          |          |       |
| References | 1- John A. Buck, "Fundamentals of Optical Fibers", Second Edition, John-Wiley & Sons, 2004<br>2- G. D. Agrawal, "Fiber Optic Communication Systems" Third Edition, John-Wiley & Sons, 2002<br>3- Mohammad Azadeh, "Fiber Optics Engineering". Springer, 2009   |              |               |         |           |     |      |          |          |       |
| EECS435    | Advanced Topics in Antennas  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS405  |              |               |         |           |     |      |          |          |       |
|            | Antenna fundamentals, analysis and design principles, radiation from wire antennas, aperture antennas, slot, horn and paraboloidal reflectors, radiation from microstrip antennas, antenna arrays, array polynomial, phased arrays and null steering, receiving antennas, polarization mismatch, antenna noise temperature, introduction to signal processing antennas, antenna broadbanding techniques. |              |               |         |           |     |      |          |          |       |
| References | Constantine Balanis, Antenna theory Analysis and Design, Wiley, 4th edition 2016   |              |               |         |           |     |      |          |          |       |





جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS436    | Mobile Communications  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS316  |              |               |         |           |     |      |          |          |       |
|            | Conventional telephone systems – Traffic theory – Conventional mobile system – Frequency spectral efficiency – Methods of increasing system capacity – System architecture – Multiple access schemes – Interference in cellular systems – Hand off – Fading and Doppler in cellular system – GSM system architecture – GSM channel coding- Ciphering and modulation – System management.   |              |               |         |           |     |      |          |          |       |
| References | 1. V K Sachan, "Wireless Cellular Communications: Principles, Designs and Applications" 2020.<br>ISBN-13: 979-8657105414<br>Publication Date: June 26, 2020<br>2. Theodore S. Rappaport "Wireless Communications: Principles and Practice" Subsequent Edition<br>ISBN-13: 978-0130422323, ISBN-10: 0130422320  |              |               |         |           |     |      |          |          |       |
| EECS441    | Advanced Topics in Electronics-2   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS201  |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in electronic systems and applications.   |              |               |         |           |     |      |          |          |       |
| References |  |              |               |         |           |     |      |          |          |       |
| EECS445    | Advanced Topics in Microwave and RF Engineering  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS405  |              |               |         |           |     |      |          |          |       |
|            | Review of transmission-line theory; planar transmission-lines and waveguides, microwave network analysis, S-parameters, discontinuities and modal analysis, impedance matching and tuning, resonators, power dividers and couplers, microwave amplifier design, stability analysis, introduction to microwave filter design techniques, modern RF & microwave CAD; measurement techniques. |              |               |         |           |     |      |          |          |       |
| References | Microwave Engineering, 4th Edition, by David M. Pozar, Wiley, Nov. 2011  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS446    | Advanced Topics in Communications-1  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS316  |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in communication systems and applications.  |              |               |         |           |     |      |          |          |       |
| References |  |              |               |         |           |     |      |          |          |       |
| EECS451    | Advanced Topics in Electronics-3   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS201+EECS301*   |              |               |         |           |     |      |          |          |       |
|            | *Corequisite course both courses may be taken in the same semester after receiving the academic approval AA  |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in electronic systems and applications.   |              |               |         |           |     |      |          |          |       |
| References |  |              |               |         |           |     |      |          |          |       |
| EECS456    | Advanced Topics in Communications-2  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS306+EECN316*   |              |               |         |           |     |      |          |          |       |
|            | *Corequisite course both courses may be taken in the same semester after receiving the academic approval AA  |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in communication systems and applications.  |              |               |         |           |     |      |          |          |       |
| References | NA   |              |               |         |           |     |      |          |          |       |
| EECS466    | Satellite Communications   | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: EECS316  |              |               |         |           |     |      |          |          |       |
|            | Overview of satellite systems - Orbits and Launching Methods - The Geostationary Orbit (GEO) - Radio Wave Propagation - The Space Link - Satellite Multiple Access Techniques - Interference between GEO satellites - Low Earth Orbit (LEO) Satellites - Applications of LEO satellite |              |               |         |           |     |      |          |          |       |
| References | 1. George Sebestyen, Steve Fujikawa, Nicholas Galassi and Alex Chuchra, "Low Earth Orbit Satellite Design", 2018.<br>2. R.N. Mutagi, "Satellite Communication: Principles and Applications", 2016.<br>3. Dennis Roddy, "Satellite Communications", Fourth edition, 2006                |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS476    | Advance Topics in Communications-3  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS316   |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in communication systems and applications.   |              |               |         |           |     |      |          |          |       |
| References |   |              |               |         |           |     |      |          |          |       |
| EECS414    | Advanced topics in Control  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: EECS304   |              |               |         |           |     |      |          |          |       |
|            | This course covers the most recently introduced topics in the applications for Control systems  |              |               |         |           |     |      |          |          |       |
| References |   |              |               |         |           |     |      |          |          |       |
| EECS417    | Applications of embedded systems  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS304+CMPS201   |              |               |         |           |     |      |          |          |       |
|            | Hardware Architectures of Embeddec Systems - Advanced Embedded Programming - Tasks and Schedulers - Interfacing to sensors and actuators - Embedded Control Systems - Programming of Control Algorithms.  |              |               |         |           |     |      |          |          |       |
| References | Changyi Gu, " Building Embedded Systems: Programmable Hardware", Apress, 2016<br>Ying Bai and Zvi Roth, "Classical and Mcdern Controls with Microcontrollers" Springer, 2019.   |              |               |         |           |     |      |          |          |       |
| EECS418    | Applications in Communications using advanced techniques  | 3            | 2             | 2       |           |     |      |          |          | 4     |
|            | Pre-requisites: EECS316+EECN406*  |              |               |         |           |     |      |          |          |       |
|            | Corequisite course both courses may be taken in the same semester after receiving the academic approval AA  |              |               |         |           |     |      |          |          |       |
|            | This course introduces different applications in communication systems using recent emerging techniques to comply with the applications and needs of the industry.  |              |               |         |           |     |      |          |          |       |
| References | NA  |              |               |         |           |     |      |          |          |       |
| EECS419    | PID single loop control   | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: EECS304   |              |               |         |           |     |      |          |          |       |
|            | Process characteristics - PID controller - Modifications to the textbook PID - Tuning PID controllers - Improving existing tuning - Tuning for integrating processes - Troubleshooting control loops - Auto-tuning - Tuning via MATLAB - Digital implementation |              |               |         |           |     |      |          |          |       |
| References | Basic and Advanced Regulatory Control: System Design and Application, Third Edition by Harold L. Wade, 3rd Edition, International Society of Automation, 2017.  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| EECS420    | Machine Learning: Digital Design Perspective  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: CMPS102 + CMPS201+EECN201   |              |               |         |           |     |      |          |          |       |
|            | Introduction to Machine learning - Deep learning and Neural networks - Convolutional Neural networks (CNNs) - RTL Design of CNNs - Fixed Point Implementation - FPGA Design Flow - High-level synthesis flow- Cpu-FPGA implementation   |              |               |         |           |     |      |          |          |       |
| References | 1. Digital Design and computer architecture by David M.Harris, 2 <sup>nd</sup> edition, Morgan Kaufmann, 2012<br>2. Neural Networks and Deep Learning by Michael Nielsen, free online book, 2013<br>3. DIGITAL INTEGRATED CIRCUITS: A DESIGN PERSPECTIVE 2nd Edition by Jan M. Rabaey, Pearson, 2002  |              |               |         |           |     |      |          |          |       |
| EECS325    | Acoustics   | 3            | 2             |         | 2         |     |      |          |          | 4     |
|            | Pre-requisites: EECS305   |              |               |         |           |     |      |          |          |       |
|            | Plane and spherical waves – Simple and compound sound sources – Dynamically analogous mechanical and acoustical circuits – Acoustic transducers – Loudspeakers; types and systems – Microphone; types and systems - Measurements of sound – Acoustics and hearing – Acoustic environment outdoors – Acoustic environment indoors - Ultrasonic applications.   |              |               |         |           |     |      |          |          |       |
| References | - Engineering Acoustics: Noise and Vibration Control Book by Jorge P. Arenas and Malcolm J. Crocker, 2020<br>- Acoustics, by Leo Beranek, McGraw-Hill, Inc., 1996   |              |               |         |           |     |      |          |          |       |
| EECS405    | Antennas  | 3            | 2             |         | 2         | 1   |      |          |          | 5     |
|            | Pre-requisites: Prerequisite(s): EECS205 + EECS305*<br>*Corequisite course, both courses may be taken in the same semester after receiving the academic approval AA   |              |               |         |           |     |      |          |          |       |
|            | Antenna fundamentals, basic antenna parameters, radiation from wire antennas, aperture antennas, radiation from microstrip antennas, antenna arrays, array polynomial, phased arrays and null steering, receiving antennas, polarization mismatch, antenna design techniques, introduction to terrestrial and extraterrestrial radio wave propagation, surface wave propagation, ionospheric propagation, microwave and millimeter wave propagation, knife-edge obstacle diffraction models, atmospheric ducts and non-standard refraction. |              |               |         |           |     |      |          |          |       |
| References | Constantine Balanis, Antenna theory Analysis and Design, Wiley, 4th edition 2016  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code   | Name/Content  | Credit Hours | Contact Hours |         |         |     |      |          |          | Total |
|--|---|--------------|---------------|---------|---------|-----|------|----------|----------|-------|
|  |   |              | Lec           | Tut (2) | App Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| EECS406  | Wireless communications<br>Pre-requisites: EECS316<br>DFT and its properties – Fading (fast, slow, and flat) – Frequency selective and non-selective – Dual Multi-Tone (DMT) – OFDM – Multi-path propagation – Delay spread values – Guard time and cyclic extension – OFDM parameters – OFDM versus single carrier modulation - Spread Spectrum – PN sequence generators – Direct sequence Spread Spectrum – Probability of error – Frequency Hopping Spread Spectrum – CDMA – DS-CDMA.  | 3            | 2             |         | 2       | 1   |      |          |          | 5     |
| References   | Wireless Communications, by Andreas F. Molisch, Wiley-IEEE Press, ISBN: 978-0-470-74186-3, December 2010  |              |               |         |         |     |      |          |          |       |
| EECS416  | Applications of Information Theory<br>Pre-requisites: EECS306<br>Introduction to information theory (Information, Entropy, Discrete memory-less channels – Mutual information – Channel capacity). Compression and source coding (Properties of source codes, construction of instantaneous codes, lossy data compression). Channel coding (linear block codes, syndrome calculation, Cyclic codes, Convolutional coding, The code tree, trellis and state diagram, ML decoding of convolutional codes, the Viterbi algorithm) - Shannon theorem of perfect secrecy | 3            | 2             |         | 2       | 1   |      |          |          | 5     |
| References   | Elements of Information Theory, 2nd Edition, by Thomas M. Cover, Joy A. Thomas, ISBN: 978-0-471-24195-9, July 2006, Wiley Press   |              |               |         |         |     |      |          |          |       |
| <b>Program Requirement (Compulsory) CCEC Track</b> |   |              |               |         |         |     |      |          |          |       |
| CMPS203  | Software Engineering<br>Pre-requisites: CMPS103<br>Software life cycle - concepts and methods of analysis - constrained system design - data, functions and relationships specifications - implementation procedures - standard specifications - reliability measures and quality assurance - integral testing - error analysis - software maintenance - documentation- project training.   | 3            | 2             |         |         | 3   |      |          |          | 5     |
| References   | Software Engineering by Ian Sommerville - 10th Edition 2015<br>Engineering Software Products: An Introduction to Modern Software Engineering by Ian Sommerville 2019  |              |               |         |         |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content  | Credit Hours | Contact Hours |         |          |     |      |          |          | Total |
|------------|---|--------------|---------------|---------|----------|-----|------|----------|----------|-------|
|            |   |              | Lec           | Tut (2) | App. Tut | Lab | Stud | Off. Tut | Off. Hrs |       |
| CMPS302    | Algorithms Design & Analysis  | 3            | 2             |         |          | 3   |      |          |          | 5     |
|            | Prerequisite(s): CMPS103  |              |               |         |          |     |      |          |          |       |
|            | Algorithms Design and analysis- examples - Techniques for designing efficient algorithms - analysis of complexity - complexity bounds of fundamental problems, graph problems and combinatorial problems – Balanced binary search trees – Dynamic programming - Divide-and-conquer - Search - Branch-and-bound - Fundamentals of parallel algorithms - Applications (approximate string matching, data compression, computational geometry) - NP-completeness - NP-hardness   |              |               |         |          |     |      |          |          |       |
| References | Introduction to Algorithms, 3rd Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, MIT Press   |              |               |         |          |     |      |          |          |       |
| CMPS402    | Machine Intelligence  | 3            | 2             |         |          | 3   |      |          |          | 5     |
|            | Pre-requisites: MTHS114 + MTHS204   |              |               |         |          |     |      |          |          |       |
|            | (Artificial Intelligence) Introduction to artificial intelligence concepts and definitions -state-space and search - knowledge representation - logic-production systems - semantic networks - frames - knowledge issues - inference - inheritance - nonmonotonic reasoning- uncertainty - fuzziness- game playing - AI-programming languages - Introduction to expert systems and knowledge engineering.- application fields that need intelligence (natural languages- learning-planning-robotics- decision support systems- intelligent agents – Semantic web) |              |               |         |          |     |      |          |          |       |
| References | Artificial Intelligence, A Modern Approach S. Russell and P. Norvig , Prentice Hall 2010 Pearson Edu (3rd Ed.)  |              |               |         |          |     |      |          |          |       |
| CMPS403    | Languages and Compilers   | 3            | 2             |         |          | 2   |      |          |          | 4     |
|            | Pre-requisites: CMPS303   |              |               |         |          |     |      |          |          |       |
|            | Introduction to the theory of languages - evolution of computer languages and translators - formal specification of languages - context dependent and context free languages - logical structure of a compiler - lexical, syntax and semantic analysis - code generation and optimization - storage and register allocation - runtime considerations  |              |               |         |          |     |      |          |          |       |
| References |   |              |               |         |          |     |      |          |          |       |
| CMPS425    | Computer System Consultation  | 2            | 2             |         |          |     |      |          |          | 2     |
|            | Pre-requisites: 70 Credits  |              |               |         |          |     |      |          |          |       |
|            | Automation- Evaluation Sheets-Comparing hardware and software alternatives-certification-tender writing- tender laws-obligations and computer system and networks evaluation – H/W and S/W bench Marking, System Design.  |              |               |         |          |     |      |          |          |       |
| References |   |              |               |         |          |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code   | Name/Content  | Credit Hours | Contact Hours |         |          |     |      |          |          |       |
|--|---|--------------|---------------|---------|----------|-----|------|----------|----------|-------|
|  |   |              | Lec           | Tut (2) | App. Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS426  | Security of Computer Systems and Networks   | 3            | 2             |         |          | 2   |      |          |          | 4     |
|  | Pre-requisites: CMPS202, CMPS405  |              |               |         |          |     |      |          |          |       |
|  | Classical Encryption Techniques - Block Ciphers and the Data Encryption Standard - Basic Number Theory and Finite Fields - Block Cipher Operation - Pseudorandom Number Generation and Stream Ciphers - Public-Key Cryptography and RSA - Other Public-Key Cryptosystems (Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic - Cryptographic Hash Functions - Message Authentication Codes - Digital Signatures - Key Management and Distribution - User Authentication Protocols Network and Internet Security - Transport-Level Security - Wireless Network Security - Electronic Mail Security - IP Security - Malicious Software – Firewalls – Legal and Ethical Issues |              |               |         |          |     |      |          |          |       |
| Reference  | Cryptography and Network Security: Principles and Practice 7th Edition, William Stallings. Pearson, 2017.   |              |               |         |          |     |      |          |          |       |
| CMPS445  | Embedded Systems  | 3            | 2             |         |          | 3   |      |          |          | 5     |
|  | Pre-requisites: CMPS201   |              |               |         |          |     |      |          |          |       |
|  | Embedded system design process - embedded computing platform- program design and analysis- Hardware accelerators - distributed embedded architectures- system analysis and architecture design- Design example – Programming project.   |              |               |         |          |     |      |          |          |       |
| Reference  | - Embedded System Design: Embedded Systems Foundations of Cyber-Physical Systems, and the Internet of Things, Authors: Peter Marwedel Edition 4th Edition, 2021.<br>Designing Embedded Systems with Arduino: A Fundamental Technology for Makers, Authors: Tianhong Pan, and Yi Zhu, 2018.  |              |               |         |          |     |      |          |          |       |
| <b>Program Requirement (Elective) CCEC Track</b> |   |              |               |         |          |     |      |          |          |       |
| CMPS111  | Advanced Logic Design and Testing   | 2            | 1             |         |          | 2   |      |          |          | 3     |
|  | Pre-requisites: CMPS101   |              |               |         |          |     |      |          |          |       |
|  | Review of Boolean algebra, Karnaugh maps, combinational and sequential circuits analysis and applications, RAM and ROM memories, programmable logic arrays (PLA, PLD, CPLD, FPGA), timing parameters, introduction to digital system testing, stuck-at-faults, design for testability "DFT", built-in self test "BIST", D-algorithm, other testing techniques, introducing VHDL languages and applications.   |              |               |         |          |     |      |          |          |       |
| References                                       | Digital Design, 6th Edition by Morris Mano, Michael Ciletti, 2018<br>System Test and testable Design, using HDL models and architecture, 1 <sup>st</sup> edition, 2011.   |              |               |         |          |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code       | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|------------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|            |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS205    | Computer Graphics and Man Machine Interfacing  | 2            | 1             |         |           | 2   |      |          |          | 3     |
|            | Pre-requisites: CMPS103  |              |               |         |           |     |      |          |          |       |
|            | Fundamentals of computer graphics - display devices - fundamentals of graphic algorithms - two-dimensional graphics - polygon representation - polygon filling - polygon clipping - three dimensional graphics - back face removal - scan line and ray tracing - illumination and shading models - programming project |              |               |         |           |     |      |          |          |       |
| References |  |              |               |         |           |     |      |          |          |       |
| CMPS206    | Multimedia   | 2            | 1             |         |           | 2   |      |          |          | 3     |
|            | Pre-requisites: CMPS103  |              |               |         |           |     |      |          |          |       |
|            | Multimedia -design and implementation of GUI- hardware interfacing- programming project.   |              |               |         |           |     |      |          |          |       |
| References |  |              |               |         |           |     |      |          |          |       |
| CMPS305    | Mobile and Web Application Development   | 3            | 2             |         |           | 2   |      |          |          | 4     |
|            | Pre-requisites: CMPS202  |              |               |         |           |     |      |          |          |       |
|            | HTML-CSS-JavaScript-PHP-MySQL-Web Design-Web Development-Introduction to Mobile Development for Android-Introduction to Mobile Development for iOS   |              |               |         |           |     |      |          |          |       |
| Reference  | 1. Web Design with HTML, CSS, JavaScript and JQuery Set, Edition, Jon Duckett, Wiley, 2014.<br>2. Native Mobile Development: A Cross-Reference for iOS and Android 1st Edition, Shaun Lewis & Mike Dunn. O'Reilly Media, 2019.   |              |               |         |           |     |      |          |          |       |
| CMPS342    | Computer Systems Programming   | 3            | 2             |         |           | 2   |      |          |          | 4     |
|            | Pre-requisites: 100 Credit   |              |               |         |           |     |      |          |          |       |
|            | Functions of system software components - design of hardware drivers, loaders and linkers, compilers, assemblers, interpreters and utilities - case study of real system programming   |              |               |         |           |     |      |          |          |       |
| Reference  |  |              |               |         |           |     |      |          |          |       |
| CMPS343    | Computation and Programming Theory   | 3            | 2             |         |           | 2   |      |          |          | 4     |
|            | Pre-requisites: CMPS302  |              |               |         |           |     |      |          |          |       |
|            | Introduction - basic automata concepts - acceptors - regular expressions - sequential machines - Turing machine - universal machine - computable and non-computable functions - recursive functions - Markov algorithms - Godel numbering - computer programming languages - proof of program correctness              |              |               |         |           |     |      |          |          |       |
| Reference  |  |              |               |         |           |     |      |          |          |       |





جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code      | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|-----------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|           |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS401   | Advanced Database Systems  | 3            | 2             |         |           | 3   |      |          |          | 5     |
|           | Pre-requisites: CMPS202  |              |               |         |           |     |      |          |          |       |
|           | Review of Database Query and Data Manipulation Languages - examples of relational, hierarchical and network database designs - distributed databases - multicopy databases - Temporal Database - database administration: security, concurrence control and performance monitoring - data compression - sizing and timing  |              |               |         |           |     |      |          |          |       |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS406   | Wireless and Mobile Network  | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: CMPS405  |              |               |         |           |     |      |          |          |       |
|           | Wireless data communication – Wireless Computer Networks – Ad Hoc Networks – Mobile IP and ATM wireless networks – Mobile Networks – GSM – GPRS - CDMA- WIFI- WIMAX – 3rd generation Mobile Networks - project implementation  |              |               |         |           |     |      |          |          |       |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS407   | Computer Modeling and Simulation   | 3            | 2             |         |           | 3   |      |          |          | 5     |
|           | Pre-requisites: CMPS101 + MTHS114  |              |               |         |           |     |      |          |          |       |
|           | Introduction to modeling and simulation - application of modeling and simulation in different fields - examples of modeling and simulation of computer units (memory, discs, processors, OS) - model development - simulation techniques - simulating operational loads - analysis of results of modeling and simulating computers - testing – project   |              |               |         |           |     |      |          |          |       |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS415   | Computer Networks-2  | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: CMPS405  |              |               |         |           |     |      |          |          |       |
|           | Theoretical foundations for building next generation Internet. To provide a detailed introduction to advanced topics in computer net-works including advanced transport layer concepts, adaptive queue management, Quality of Service fundamentals, packet scheduling, multimedia networking, content distribution networks and network measurements. Methodologies and tools in undertaking research in networking - Performance issues and QoS mechanisms in the Internet. Expertise in network programming and computer network simulation. |              |               |         |           |     |      |          |          |       |
| Reference |  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code      | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|-----------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|           |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS441   | Computer Peripherals  | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: CMPS301   |              |               |         |           |     |      |          |          |       |
|           | Types of computer peripherals – connection of peripherals - use of channels - programming of channels - operation of channels in concurrence with CPU - synchronization and handshaking   |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS442   | Fault Tolerant Computing  | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: MTHS114 + MTHS204   |              |               |         |           |     |      |          |          |       |
|           | Introduction to fault tolerant systems - faults and their manifestations - error detection - protective redundancy - fault tolerant software - measures of fault tolerance – case studies   |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS443   | Computer Manufacturing Technology   | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: CMPS301   |              |               |         |           |     |      |          |          |       |
|           | This course covers the process of the computer manufacturing especially materials, devices and computer equipment, quality control and reliability measures. The course covers the flow from architecture definition. It then covers the basics of Integrated circuits manufacturing using CMOS technology. It exposes the package choice of the CMOS technology as well. In subsequent parts it covers the process of mother board design and manufacturing. Assembly process and automation follows. Finally, overall system testing and quality control processes. |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS444   | Computer Interfacing  | 3            | 2             |         |           | 2   |      |          |          | 4     |
|           | Pre-requisites: CMPS201 + CMPS205   |              |               |         |           |     |      |          |          |       |
|           | Basic interfacing hardware - buses and memory/peripheral connections - interrupts - synchronous and asynchronous connections - serial and parallel interfaces - analog interfaces – Analog to Digital – Digital to Analog Converters – USB- Wireless interface- special interfaces.   |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS446   | Image Processing and Computer Vision  | 3            | 2             |         |           | 3   |      |          |          | 5     |
|           | Pre-requisites: MTHS204   |              |               |         |           |     |      |          |          |       |
|           | Image representation - methods of image processing - enhancement - data compression - reconstruction from projection - features extraction - image analysis - pattern recognition - computer vision   |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code      | Name/Content   | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|-----------|--|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|           |  |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS447   | Optical Networks<br>Pre-requisites: CMPS405<br>Introduction to optical networks –Propagation of signals in optical fibres- components (couplers- multiplexers and filters-optical amplifiers- transmitters- detectors- switches- wavelength converters)- modulation and demodulation- transmission system engineering- client layers of optical layer- WDM network elements and design- control and management- photonic packet switching- design example. | 3            | 2             |         |           | 2   |      |          |          | 4     |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS448   | High Performance Computing and Parallel Programming<br>Pre-requisites: CMPS301 + CMPS302<br>Storage devices and Interconnects- file systems- access patterns and optimizations- low-level I/O Interfaces- scientific data libraries- special purpose I/O techniques- data management and analysis- numerical examples  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS449   | Real Time Computers<br>Pre-requisites: CMPS445<br>Introduction to real time computers - real time operation requirements - real time operating systems - data capturing and processing in real time - examples of real time applications.  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS450   | Pattern Recognition and Artificial Neural Networks<br>Pre-requisites: CMPS102 + MTHS114<br>Introduction to basic concepts for NN-single and multilayer perceptrons learning algorithms- feedforward and feedback architectures - recurrent networks- associative memory networks- design and hardware implementation of NN- typical examples.  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |  |              |               |         |           |     |      |          |          |       |
| CMPS451   | Data Mining, Big Data and Data Analytics<br>Pre-requisites: MTHS204+ MTHS114<br>Introduction to Data Mining, Data, Collection, Sampling and Preprocessing, Predictive and Descriptive Analytics, Survival Analysis, Social Networks Analysis, Modelling and Benchmarking and privacy, Mini project Application using Hadoop and Map Reduce tools.  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference | -Data mining and data warehousing: principles and practical techniques. Cambridge University Press, 2019.<br>-Big Data Analytics: Systems, Algorithms, Applications. Springer Nature, 2019.  |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code      | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|-----------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|           |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS452   | Advanced Cybersecurity<br>Pre-requisites: CMPS426, CMPS405<br>Security policies, security mechanisms, security awareness, user authentication, applied encryption, external and internal firewalls, intrusion detection, security of operating systems, databases and software, security of web applications, design of security system and components, devices for security analysis: sniffers, attack detectors, ethical issues in computer security. | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference | Computer Security and the Internet: Tools and Jewels, By Paul van Oorshot   |              |               |         |           |     |      |          |          |       |
| CMPS453   | Cloud Computing<br>Pre-requisites: CMPS405<br>Current topics in Cloud Computing. Details TBD  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS454   | Natural Language Processing<br>Pre-requisites: CMPS211 + MTHS114<br>Current topics in Natural Language Processing. Details TBD  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS455   | Parallel Processing<br>Pre-requisites: CMPS301 + CMPS302<br>Current topics in Parallel Processing. Details TBD  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS456   | Mobile Robotics<br>Pre-requisites: CMPS102 + MTHS204<br>Mobile robotics is a necessary topic for intelligent autonomous robots. It helps robots to perform navigation tasks. This course focuses on state estimation, localization, mapping, SLAM and path planning techniques.   | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS461   | Selected Topics in Computer Engineering<br>Pre-requisites: 100 Credits<br>Selected topics related to the state of the art in computer engineering.  | 3            | 2             |         |           | 3   |      |          |          | 5     |
| Reference |   |              |               |         |           |     |      |          |          |       |



جامعة القاهرة  
Cairo  
University

**BYLAWS 2023**  
**Bachelor of Science Degree**  
**Credit Hours System**



كلية الهندسة  
Faculty of  
Engineering

| Code      | Name/Content  | Credit Hours | Contact Hours |         |           |     |      |          |          |       |
|-----------|---|--------------|---------------|---------|-----------|-----|------|----------|----------|-------|
|           |   |              | Lec           | Tut (2) | App . Tut | Lab | Stud | Off. Tut | Off. Hrs | Total |
| CMPS462   | Selected Topics in Information Technology                                 | 3            | 2             |         |           | 3   |      |          |          | 5     |
|           | Pre-requisites: 100 Credits   |              |               |         |           |     |      |          |          |       |
|           | Selected topics related to the state of the art in information technology |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |
| CMPS463   | Advanced Topics in Computer Engineering                                   | 3            | 2             |         |           | 3   |      |          |          | 5     |
|           | Pre-requisites: 100 Credits   |              |               |         |           |     |      |          |          |       |
|           | Selected topics related to the state of the art in computer engineering.  |              |               |         |           |     |      |          |          |       |
| Reference |   |              |               |         |           |     |      |          |          |       |

Specialized Tracks of Engineering Profession