

Sana'a University
Faculty of Engineering
Electrical Engineering
Department

Computer
Engineering and
Control

Program Specifications

October - 2020

Faculty of Engineering, Sana'a University

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Computer Engineering and Control Program specifications

| Program Identification and General Information | |
|--|--|
| Program Title | Computer Engineering and Control |
| Host Element | Sana'a University |
| Responsible Department | Electrical Engineering Department |
| Other Departments with major Teaching Contributions | Mechanical Engineering Department, Mechatronics Engineering Department |
| Media of Instruction | English Language |
| Mode of Delivery | Semesters |
| Total credit hours needed for completion of the program | ١٨٠ |
| Length full time | Five academic years (two terms each - full time) |
| Award granted on completion of the Program | Bachelor of Science in Computer Engineering and Control. |
| Location(s) where the program is offered | Inside the University (Faculty of Engineering) |
| Approval date: | October 2020 |

Vision, Mission & Aims of the Department:

Vision:

Sustain the leadership locally and be excellence regionally in education and scientific research in the different fields of electrical Engineering.

Mission:

Graduate qualified Engineers in Electric Power, communication and computer engineering in accordance with programs committed to the international quality standards. The Graduating Engineers handed with enough knowledge and skills necessary to meet the requirements of development as well as local and regional labor markets. Also, they able to self-development and proceed with contemporary issues. The department contribute to community wellness and the country development

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through scientific research, advisory services, and training and education programs.

Aims of the Department:

1. Graduate high qualified engineers in electrical power, communication and computer engineering able to compete at national and regional levels.
2. Update undergraduate and post graduate programs and enhance the applied research environment to contribute in country development.
3. Establish partnerships with the public and private sectors and provide engineering consultancies, continuous training, teaching and awareness programs.
4. Improve the academic staff to student ratio as per standard.
5. Fill the gap in the number of assistance staff and laboratory technicians and implement training programs to enhance their skills.
6. Commit and uphold high ethical and professional conduct in the education and practice of engineering.

Program Aims

1. Strong foundation of basic sciences and mathematics and the ability to apply this knowledge to analyze and solve engineering problems.
2. Broad theoretical as well as practical knowledge related to computer and control engineering specialization.
3. Good communication skills, both orally and in writing, and ability to work effectively individually or as a team member.
4. Ability to use computer simulations tools, and software packages to design projects or systems to meet specified requirements
5. Ability to use the techniques, skills, and modern tools necessary for computer & control engineering practice.
6. Skills to propose, analyze, validate, interpret, install and maintain computer solutions in real life contexts and a variety of areas of application within an organization.
7. An understanding of professional and ethical responsibility, abilities for critical thinking, life-long learning, and updating of technical knowledge while working as professional engineers.

Graduate Attributes:

In addition to the general attributes of the Electrical Engineering, the graduate of Computer Engineering and Control program should be able to:

- 1- Design, implement and evaluate the components (hardware and software) of computer-based systems.
- 2- Employ modeling and simulation tools to monitor computer systems.

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Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of an undergraduate Computer Engineering and Control program, the graduates will be able to:

- A1: Demonstrate an understanding of related knowledge in mathematics and science related to Computer Engineering and Control program.
- A2: Understand principles of design including elements, processes and/or systems related to Computer Engineering and Control program.
- A3: Acquire knowledge of contemporary issues.
- A4: Understand professional and ethical responsibilities.

B. Intellectual/ Cognitive Skills

Upon successful completion of an undergraduate Computer Engineering and Control program, the graduates will be able to:

- B1: Identify, formulate and solve engineering problems related to Computer Engineering and Control program.
- B2: Analyze, interpret and evaluate data.
- B3: Analyze digital & electronic systems and processes using appropriate modeling techniques
- B4: Consider economic, social and environmental dimensions in engineering design related to Computer Engineering and Control program.

C. Professional and Practical Skills

Upon successful completion of an undergraduate Computer Engineering and Control program, the graduates will be able to:

- C1: Apply acquired knowledge in mathematics and science in solving engineering problems related to Computer Engineering and Control program.
- C2: Design, Computer and Control components or systems to meet desired specifications and imposed constraints.
- C3: Conduct tests related to Computer and Control Engineering practice and interpret data.
- C4: Use modern engineering techniques, skills and computing tools related to Computer Engineering and Control program.



D. General / Transferable Skills

Upon successful completion of an undergraduate Computer Engineering and Control program, the graduates will be able to:

- D1: Work effectively within teams.
- D2: Engage in independent lifelong learning.
- D3: Adopt professional and ethical responsibilities.
- D4. Communicate effectively both orally and in written forms.
- D5. Conduct searches of literature

System of Study

| | |
|--|------------------------------|
| Terms of study. Specify the structure of the academic year of study in the program, does it follow a year or semester, Total Credit hours), mode of delivery etc., | Semester System 180 Hours |
|--|------------------------------|

Study Credit.
Specify the program structure and the distribution of Credit and average for each component of the program. Therefore the program structure should specify:
Total number of hours; core requirements; elective requirements, particularly any restriction on electives; the minimum and/or maximum credit points of certain elements of the program where applicable; the requirements for activities such as field studies or professional practice, and Specify how to calculate the student GPA, etc.

| Program Requirement | % |
|----------------------------|------------------|
| • University Requirements. | 17 Hours 9.4 % |
| • Faculty Requirements. | 6 Hours 3.3 % |
| • Department Requirements. | 25 Hours 13.8 % |
| • Program Requirements. | 132 Hours 73.5 % |

1. Admission Requirements:

Specify the criteria as part of the admission process, such as percentage of secondary school, audition, placement tests, or interview.

- 1- High School Certificate with not less than 80 % passing ratio.
- 2- Screening test
- 3- Student number capacity of 100 students per year

2. Degree Requirements

The purpose of this section is to describe how the way in which students progress through the program relates to the development/ achievement of the learning. (Progression Requirements in order to

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proceed to the next year or to obtain a degree).

| | |
|-------------------------------|--|
| Year 1 to year 2: | Total Credit Hours for Year 1 (Hours) 35 |
| Year 2 to year 3 | Total Credit Hours for Year 2 (Hours) 36 |
| Year 3 to year 4: | Total Credit Hours for Year 3 (Hours) 42 |
| Year4 to year 5: | Total Credit Hours for Year 4 (Hours) 38 |
| Year5 to obtain Degree | Total Credit Hours for Year 5 (Hours) 29 |

The specification of the degree requirements, which a student must fulfill in order to be eligible to graduate. E.g. total number of credit hours; GPA required for graduation, What awaits him/her if he/she did not achieve the accumulative GPA in semester or year ?. If a student got an Academy leave, or stop the study in the program for whatever reason, what are the requirements for continuing his/her study in the program again?, If the current version of the program is different from the previous one, where he/she studied, how you will deal with him/her with regard to the requirements of graduation?, What are the requirements for graduation from the program for the student transferring from another program, from the same university or from another university? Etc..

Course Coding Abbreviations:

- E**-stands for Electrical Engineering Department
- EE**-stands for common courses between the programs
- EPM**-stands for Electrical Power and Machine Engineering Program
- CN**-stands for Communication and Network Engineering Program
- CC**-stands for Computer and Control Engineering Program
- UR**-stands for university requirement
- FR**-stands for faculty requirement
- BR**- stands for department requirement
- ME**-stands for courses offered by Mechanical Engineering Department



Study Plan 2020

The structure and content of the program should be consistent with the University's policy Structure and Requirements of the Awarded Bachelor's Degree and related to University policies.

Study Plan by Requirements:

University Requirements

| No | Course No. | Course Name | اسم المقرر | CH | L | T | P |
|--------------|------------|------------------------|--------------------------|-----|----|---|---|
| | | | | س.م | م | ت | ع |
| 1 | UR001 | Arabic Language 1 | لغة عربية ١ | 2 | 2 | 0 | 0 |
| 2 | UR002 | English Language 1 | لغة انجليزية ١ | 2 | 2 | 0 | 0 |
| 3 | UR003 | Computer Skills | مهارات حاسوب | 3 | 2 | 0 | 2 |
| 4 | UR004 | Arabic Language 2 | لغة عربية ٢ | 2 | 2 | 0 | 0 |
| 5 | UR005 | English Language 2 | لغة انجليزية ٢ | 2 | 2 | 0 | 0 |
| 6 | UR006 | Islamic Culture | ثقافة اسلامية | 2 | 2 | 0 | 0 |
| 7 | UR007 | Arabic Israel Conflict | الصراع العربي الاسرائيلي | 2 | 2 | 0 | 0 |
| 8 | UR008 | National Culture | الثقافة الوطنية | 2 | 2 | 0 | 0 |
| Total | | | | 17 | 16 | 0 | 2 |

Faculty Requirements

| No | Course No. | Course Name | اسم المقرر | CH | L | T | P |
|--------------|------------|--|---------------------------|-----|---|----|---|
| | | | | س.م | م | ت | ع |
| 1 | FR001 | Mathematics 1 | رياضيات ١ | 3 | 2 | 2 | 0 |
| 2 | FR002 | Engineering Physics | فيزياء هندسية | 4 | 2 | 2 | 2 |
| 3 | FR003 | Mathematics 2 | رياضيات ٢ | 3 | 2 | 2 | 0 |
| 4 | FR304 | Engineering Project Management | إدارة مشاريع هندسية | 2 | 1 | 2 | 0 |
| 5 | FR305 | Entrepreneurship & Communication Skill | ريادة اعمال ومهارات تواصل | 2 | 1 | 2 | 0 |
| Total | | | | 14 | 8 | 10 | 2 |

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Basic Requirements

| No | Course No. | Course Name | اسم المقرر | CH | L | T | P |
|--------------|------------|--|-------------------------------|-------|----|---|---|
| | | | | س. م. | م | ت | ع |
| 1. | BR002 | Engineering Workshop | ورش هندسية | 3 | 2 | 0 | 2 |
| 2. | BR003 | Engineering Drawing | رسم هندسي | 3 | 1 | 0 | 4 |
| 3. | BR007 | Engineering Mechanics | ميكانيكا هندسية | 3 | 2 | 2 | 0 |
| 4. | BR111 | Scientific English | انجليزي علمي | 2 | 2 | 0 | 0 |
| 5. | BR112 | Technical Writing | تقارير فنية | 2 | 2 | 0 | 0 |
| 6. | BR121 | Linear Algebra | جبر خطي | 3 | 2 | 2 | 0 |
| 7. | BR122 | Differential Equations | معادلات تفاضلية | 3 | 2 | 2 | 0 |
| 8. | BR223 | Engineering Mathematics | رياضيات هندسية | 3 | 2 | 2 | 0 |
| 9. | BR231 | Probability and Statistics for Engineers | الاحتمالات والاحصاء للمهندسين | 2 | 2 | 0 | 0 |
| Total | | | | ٢٤ | 17 | 8 | 6 |



Elective Courses

| No. | Elective No. | Course Name | اسم المقرر | Credit CH | Lec. | Tu. | Pr | Level/Semester | CODE |
|-----|--------------|---|--|-----------|------|-----|----|--|--------|
| 1. | Elective 1 | Compiler Theory and Design | نظرية المترجم وتصميمة | ٣ | ٢ | ٢ | - | 4 th Level/1 st Semester | CCE347 |
| | | Computer Interfacing | واجهات الكمبيوتر | ٣ | ٢ | ٢ | - | | CCE334 |
| 2. | Elective 2 | Cloud Technology and IoT | تقنية السحابة وانترنت الاشياء | ٣ | ٢ | ٢ | - | 4 th Level/2 nd Semester | CCE324 |
| | | Distributed and Parallel Processing | المعالجة الموزعة والمتوازية | ٣ | ٢ | ٢ | - | | CCE325 |
| 3. | Elective 3 | Advanced Database | قواعد بيانات متقدمة | ٣ | ٢ | ٢ | - | 5 th Level/1 st Semester | CCE428 |
| | | Advanced Artificial Intelligence | ذكاء اصطناعي متقدم | ٣ | ٢ | ٢ | - | | CCE429 |
| 4. | Elective 4 | Wireless and Wide Area Networks | الشبكات اللاسلكية والشبكات ذات النطاق الواسع | ٣ | ٢ | ٢ | - | 5 th Level/2 nd Semester | CCE453 |
| | | Industrial Automation and SCADA Systems | الآتمة الصناعية وأنظمة SCADA | ٣ | ٢ | ٢ | - | | CCE438 |

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Course Plan/First Year

| Year | Semester | Course code | Course Name | اسم المقرر | Credit CH | Lec . | Tu . | Pr. | Pre-Req. | Co-Req. | |
|------------------------------|-----------------------------|------------------|-------------------------|--------------------------|-----------|-----------|-----------|----------|-------------------------|-------------|--|
| First Year | First Semester | BR002 | Engineering Workshop | ورش هندسية | 3 | 2 | 0 | 2 | NA | (blank) | |
| | | FR002 | Engineering Physics | فيزياء هندسية | 4 | 2 | 2 | 2 | | (blank) | |
| | | FR001 | Mathematics 1 | رياضيات ١ | 3 | 2 | 2 | 0 | | (blank) | |
| | | UR001 | Arabic Language ١ | لغة عربية ١ | 2 | 2 | 0 | 0 | | (blank) | |
| | | UR002 | English Language ١ | لغة انجليزية ١ | 2 | 2 | 0 | 0 | | (blank) | |
| | | UR003 | Computer Skills | مهارات حاسوب | 3 | 2 | 0 | 2 | | (blank) | |
| | | UR007 | Arabic Israeli Conflict | الصراع العربي الاسرائيلي | 2 | 2 | 0 | 0 | | (blank) | |
| | First Semester Total | | | | | 19 | 14 | 4 | 6 | First Total | |
| | Second Semester | BR00٣ | Engineering Drawing | الرسم الهندسي | 3 | 1 | 0 | 4 | FR001 | (blank) | |
| | | BR007 | Engineering Mechanics | ميكانيكا هندسية | 3 | 2 | 2 | 0 | | (blank) | |
| | | FR003 | Mathematics 2 | رياضيات ٢ | 3 | 2 | 2 | 0 | | (blank) | |
| | | UR004 | Arabic Language 2 | لغة عربية ٢ | 2 | 2 | 0 | 0 | UR001 | (blank) | |
| | | UR005 | English Language 2 | لغة انجليزية ٢ | 2 | 2 | 0 | 0 | UR003 | (blank) | |
| | | UR006 | Islamic Culture | ثقافة اسلامية | 2 | 2 | 0 | 0 | NA | (blank) | |
| UR008 | | National Culture | الثقافة الوطنية | 2 | 2 | 0 | 0 | (blank) | | | |
| Second Semester Total | | | | | 17 | 13 | 4 | 4 | Second Total | | |
| First Year Total | | | | | 36 | 27 | 9 | 6 | First Year Total | | |

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Course Plan/Second Year

| Year | Semester | Course Code | Course Name | اسم المقرر | Credit CH | Lec . | Tu. | Pr. | Pre-Req. | Co-Req. | |
|--------------------------|------------------------------|-------------|------------------------------------|------------------------|-----------|-----------|-----------|-----------|--------------------------|---------|--|
| Second Year | First Semester | BR111 | Scientific English | انجليزي علمي | 2 | 2 | 0 | 0 | UR005 | (blank) | |
| | | BR121 | Linear Algebra | جبر خطي | 3 | 2 | 2 | 0 | NA | (blank) | |
| | | CCE111 | Logic Circuits 1 | دوائر منطقية ١ | 3 | 2 | 0 | 2 | | (blank) | |
| | | PME111 | Electrical Circuits 1 | دوائر كهربائية ١ | 4 | 2 | 2 | 2 | FR002 | (blank) | |
| | | CCE141 | Programming Language 1 (Python) | لغة برمجة ١ (بايثون) | 3 | 2 | 0 | 2 | UR003 | (blank) | |
| | | CCE142 | Introduction to Computation Theory | مدخل الى نظرية الحوسبة | 3 | 2 | 0 | 2 | UR003 | | |
| | First Semester Total | | | | | 18 | 12 | 4 | 8 | | |
| | Second Semester | BR112 | Technical Writing | تقارير فنية | 2 | 2 | 0 | 0 | BR111 | (blank) | |
| | | BR122 | Differential Equations | معادلات تفاضلية | 3 | 2 | 2 | 0 | BR121 | (blank) | |
| | | CCE112 | Logic Circuits 2 | دوائر منطقية ٢ | 3 | 2 | 0 | 2 | CCE111 | (blank) | |
| | | PME112 | Electrical Circuits 2 | دوائر كهربائية ٢ | 4 | 2 | 2 | 2 | PME111 | (blank) | |
| | | PME113 | Electronics 1 | الالكترونيات ١ | 4 | 2 | 2 | 2 | | (blank) | |
| | | CCE143 | Programming Language 2 (C/C++) | لغة برمجة ٢ (سي/سي++) | 3 | 2 | 0 | 2 | CCE141 | (blank) | |
| | Second Semester Total | | | | | 19 | 12 | 6 | 8 | | |
| Second Year Total | | | | | 37 | 24 | 10 | 16 | Second Year Total | | |

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Course Plan/Third Year

| Year | Semester | Course Code | Course Name | اسم المقرر | Credit | Lec . | Tu. | Pr. | Pre-Req. | Co-Req. | |
|-------------------------|------------------------------|-------------|--|--------------------------------|-----------|-----------|-----------|-----------|----------------------------|---------|--|
| Third Year | First Semester | BR223 | Engineering Mathematics | رياضيات هندسية | 3 | 2 | 2 | 0 | BR122 | (blank) | |
| | | CCE244 | Programming Language 3 (Java) | لغة برمجة ٣ (جاڤا) | 3 | 2 | 0 | 2 | CCE143 | (blank) | |
| | | CCE214 | Microprocessors & Assembly Language | المعالجات الدقيقة ولغة التجميع | 3 | 2 | 0 | 2 | CCE143 | (blank) | |
| | | BR231 | Probability and Statistics for Engineers | الاحتمالات والاحصاء للمهندسين | 2 | 2 | 0 | 0 | BR122 | (blank) | |
| | | CNE214 | Signals and Systems | إشارات ونظم | 3 | 2 | 0 | 2 | EE102 BR122 | BR201 | |
| | | PME214 | Electronics ٢ | الالكترونيات ٢ | 4 | 2 | 2 | 2 | PME113 | EE215 | |
| | First Semester Total | | | | | 18 | 12 | 4 | 8 | | |
| | Second Semester | CNE213 | Fields Theory | نظرية المجالات | 3 | 2 | 2 | 0 | FR002 | (blank) | |
| | | CCE213 | Digital Electronics Circuits | دوائر الكترونية رقمية | 3 | 2 | 0 | 2 | CCE242 | (blank) | |
| | | CCE246 | Data Structures and Algorithms | هيكلية البيانات والخوارزميات | 3 | 2 | 0 | 2 | CCE214 EE182 | (blank) | |
| | | CCE245 | Hardware Design Language | لغة تصميم الحواسيب | 3 | 2 | 0 | 2 | CCE142 CCE143 CCE214 | (blank) | |
| | | PME225 | Electrical Machines | الات كهربائية | 4 | 2 | 2 | 2 | PME112 | (blank) | |
| | | PME223 | Electrical Measurements and Instrumentations | القياسات الكهربائية وتجهيزاتها | 4 | 2 | 2 | 2 | PME112 | (blank) | |
| | Second Semester Total | | | | | 20 | 12 | 6 | 10 | | |
| Third Year Total | | | | | 38 | 24 | 10 | 18 | Third Year Total | | |



Course Plan/Fourth Year

| Year | Semester | Course Code | Course Name | اسم المقرر | Credit | Lec. | Tu. | Pr. | Pre-Requ. | Co-Requ. | |
|-------------|-----------------------------|--|--|------------------------|--------|-----------|-----------|----------|---------------------------|--------------------|--|
| Fourth Year | First Semester | CCE332 | Analog Control Systems | نظم تحكم تماثلية | 3 | 2 | 2 | 0 | EE231 | (blank) | |
| | | CCE315 | Computer Architecture and Organization | معمارية وتنظيم الحاسوب | 3 | 2 | 2 | 0 | CCE246 EE182 | (blank) | |
| | | CCE321 | Operating Systems | نظم تشغيل | 3 | 2 | 0 | 2 | CCE245 EE182 | (blank) | |
| | | CCE316 | Digital Systems Design | تصميم النظم الرقمية | 3 | 2 | 0 | 2 | CCE106 | (blank) | |
| | | CCE333 | Digital Signal Processing | معالجة اشارات رقمية | 3 | 2 | 0 | 2 | EE231 | (blank) | |
| | | CCE391 | Elective Course ١ | مقرر اختياري ١ | 3 | 2 | 2 | 0 | NA | (blank) | |
| | | CCE335 | Embedded Systems | أنظمة مدمجة | 3 | 2 | 0 | 2 | CCE106 EE242 CCE286 | (blank) | |
| | First Semester Total | | | | | 21 | 14 | 6 | 8 | First Total | |
| | Second Semester | CCE322 | Software Engineering | هندسة برمجيات | 3 | 2 | 0 | 2 | NA | (blank) | |
| | | CCE323 | Database Systems | انظمة قواعد البيانات | 3 | 2 | 0 | 2 | CCE284 | (blank) | |
| | | CCE392 | Elective Course 2 | مقرر اختياري ٢ | 3 | 2 | 0 | 2 | NA | (blank) | |
| | | CCE336 | Digital Control Systems | نظم تحكم رقمية | 3 | 2 | 2 | 0 | CCE332 | (blank) | |
| | | CCE326 | Artificial Intelligence | الذكاء الاصطناعي | 3 | 2 | 0 | 2 | CCE284 | (blank) | |
| FR304 | | Engineering Project Management | إدارة مشاريع هندسية | 2 | 1 | 2 | 0 | | (blank) | | |
| | FR305 | Entrepreneurship & Communication Skill | ريادة اعمال ومهارات تواصل | 2 | 1 | 2 | 0 | | | | |

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|--|------------------------------|-----------|-----------|-----------|-----------|--------------------------|
| | Second Semester Total | 19 | 12 | 6 | 8 | <i>Second Total</i> |
| | Fourth Year Total | 40 | 26 | 12 | 16 | Fourth Year Total |

Course Plan/Fifth Year

| Year | Semester | Course code | Course Name | اسم المقرر | Credit | Lec. | Tu. | Pr. | Pre-Req. | Co-Req. | |
|------------|-----------------------------|-------------|--------------------------|----------------------------------|--------------------------|-----------|-----------|----------|------------------|--------------------|---------|
| Fifth Year | First Semester | CCE437 | Introduction to Robotics | مقدمة في الروبوت | 3 | 2 | 2 | 0 | CCE467 EE335 | | |
| | | CCE451 | Computer Networks | شبكات الحاسوب | 3 | 2 | 0 | 2 | | | |
| | | CCE427 | Digital Image Processing | معالجة الاشارات الرقمية | 3 | 2 | 0 | 2 | CCE362 CCE382 | (blank) | |
| | | CCE417 | Digital Computer Design | تصميم الحاسب الرقمي | 3 | 2 | 0 | 2 | EE333 | (blank) | |
| | | CCE493 | Elective Course 3 | مقرر اختياري ٣ | 3 | 2 | 0 | 2 | NA | (blank) | |
| | | PME415 | Graduate Project 1 | مشروع التخرج ١ | 2 | 1 | 0 | 2 | | (blank) | |
| | First Semester Total | | | | | 17 | 11 | 2 | 10 | <i>First Total</i> | |
| | | | CCE452 | Information and Network Security | أمنية المعلومات والشبكات | 3 | 2 | 0 | 2 | | (blank) |
| | | | CCE494 | Elective Course 4 | مقرر اختياري ٤ | 3 | 2 | 0 | 2 | | (blank) |
| | | | PME416 | Industrial Training | تدريب صناعي | 3 | 1 | 0 | 4 | | (blank) |
| | | PME415 | Graduate Project 2 | مشروع التخرج ٢ | 3 | 2 | 2 | 0 | | (blank) | |

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Electrical Engineering Department
Computer Engineering and Control Program



| | | | | | | |
|--|------------------------------|------------|------------|-----------|-----------|-------------------------|
| | Second Semester Total | 12 | 7 | 2 | 8 | Second Total |
| | | | | | | |
| | Fifth Year Total | 29 | 18 | 4 | 18 | Fifth Year Total |
| | Program Total | 180 | 119 | 44 | 78 | Program Total |

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