# Covenant University

**B.Eng. Degree Programme in**

# Computer Engineering

# Programme Outcomes (POs)
# Student Outcomes (SOs)

**Programme Educational Objectives (PEOs)**

The Computer Engineering Programme has established the following objectives, of the undergraduate programme to support our mission and that of the University. Graduates are expected to be able to attain the following objectives within the five (5) years of training at Covenant University:

**PEO1:** Develop knowledge, skills (including transferable skills, such as leadership, motivation, time management, prioritization, delegation, listening, communication, analytics) and understanding, as well as awareness and "know how", in the fields of engineering and its related disciplines so that as graduates they will be equipped to enter into self-employment and employment as professional engineers progressing on to Registered Engineer or equivalent status or a wide range of other professional careers.

**PEO2:** Prepare them to engage in life-long and critical enquiry with skills in research and knowledge acquisition and an appreciation of the value of education to the wider community.

**PEO3:** Provide them with internationally recognized qualifications which meet and exceed the requirements of the COREN Outcome-Based Education Benchmark for Engineering Programmes in Nigeria and international Benchmark Statements for Engineering for ABET, Engineering Council, UK, etc.

**PEO4:** Provide the engineering industry and profession, in Nigeria and elsewhere, with ready employable and enterprising graduates prepared for the assumption of technical, managerial, and financial responsibilities.

**PEO5:** Achieve the above in the contexts of the Covenant University Vision business plans, following the University's policies and procedures and conforming to the relevant sections of the Quality and Academic Standards (QAS) guidelines.

**Mapping of PEOs to University, Department, and Programme Mission and Vision**

The PEOs of the Computer Engineering Programme aligns with the overall mission of Covenant University, which is founded on creating knowledge that is life-applicable through a Human Development and Total Man Concept-driven curriculum. Technology-enhanced learning tools are adopted to enrich the students' learning experience and train Information and Communication Engineers imbibed with team spirit, who will collaborate with other professionals to create a sustainable world and enhance the global quality of life. The programme curriculum is regularly reviewed and revised to accommodate recent trends and the changing industrial requirements for Computer Engineering graduates while ensuring that the minimum benchmark standards of the relevant national and professional accreditation agencies are met. Industrial placement is ensured so that their educational training is life-applicable and meets industrial needs. The PEOs of the Computer Engineering Programme, in line with the entrepreneurship and total man concept goals of Covenant University, seeks to produce graduates who are resourceful, creative, knowledgeable, and able to perform modern engineering functions in all areas of exposure. The Programme Educational Objectives of the Computer Engineering Programme specifically aligns with the Covenant University mission statement as follows:

a. All graduates are equipped with tools to progress in their future careers with minimal supervision as they attain higher responsibility and greater technical accountability.

b. All graduates are prepared to obtain membership in relevant professional bodies, acquire relevant certifications, or advance their knowledge in graduate schools.

c. All graduates are furnished with the necessary tools to function effectively in entrepreneurial initiatives, civil service, industrial or commercial activities.

d. All graduates are supplied with technical and leadership skills meant to cause them to make informed contributions to technological issues in a globalized environment and be part of the future world-changers and innovators that will re-open new frontiers for human advancement.

The objectives align with the University's mission statement, as underlined in Section 3.2 – Programme Educational Objectives. Objectives 'a', 'b,' 'c' and 'd' are clearly mapped out from the mission and show the depth of meeting the aspirations of the Board of Regent for the programme.

The Computer Engineering Programme constituencies/ stakeholders include industry, academia (graduate research programmes), national laboratories, state and federal agencies, regulatory agencies (COREN, NUC), faculty members, students, alumni, and employers. These constituencies have their own needs addressed by the Programme Educational Objectives.

In order to have first-hand information on the impact of the Computer Engineering programme on our alumni, towards achieving the twelve programme outcomes that are mapped to the programme educational objectives, the following are the significant constituencies:

**Faculty:** Faculty members are directly involved in implementing the programme outcomes, assessment processes, and analysis and review of the objectives and outcomes.

**Alumni:** This group of stakeholders look forward to the continued quality and reputation of the programme as it shows the quality of the education acquired. The alumni must have been employed for 3-5 years and the recent graduate of the programme. They have the experience on both sides of the wall to assess the PEOs and POs.

**Graduate/Alumni Employers:** Employers' positive assessment of the programme translates into opportunities for graduates of the programme.

**Advisory Board:** This group comprises of the representatives of the industry, employers of our graduates, alumni, faculty, and current students.

**COREN:** This stands for Council for the Regulation of Engineering in Nigeria. This body accredits Universities in Nigeria to run programmes in Engineering. The BMAS must be met because a standard has been set to meet the Washington Accord. The requirement for the PEO for engineering programmes was embedded into the BMAS of the regulatory agency for engineering education in the year September 2019. Subsequently, the College of Engineering at Covenant University formulated hers and was approved by the University Senate.

**Graduate/Alumni Follow-up Survey:** This provides a means of assessing how well the programme has prepared our alumni for the industry based on the PEOs and POs. In detail, the Alumnus status in the industry or company is established, including general, personal, and employer information. The relevance and required update of the PEOs towards their professional development are assessed. A survey form is prepared to meet this requirement.

**Graduate/Alumni: Employer Follow-up Survey:** The survey is essentially similar to the Graduate Follow-up Survey. It focuses on the activities of the graduate meeting the PEOs and POs in an objective and unbiased manner compared to the graduate survey.

**Advisory Board Review:** The meeting for deliberations and feedback on the survey is annual. Members of the board shall consist of individuals in various companies that cover all the Computer Engineering disciplines of telecommunications, production and information engineering, and professionals in emerging technologies application. Other members shall be alumni of the programme.

## Programme Outcomes (POs)

**Table 1: Programme Outcomes**

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| **PO1** | **Engineering knowledge** - Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of developmental and complex engineering problems |
| **PO1.1** | Demonstrate ability to identify and apply knowledge and technique in mathematics, science, and engineering to solve engineering problems. |
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| **PO2** | **Problem Analysis** – Identify, formulate, research literature, and analyze developmental and complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO2.1** | Demonstrate ability to solve problems by concepts through the integration of mathematics, science, and engineering. |
| **PO2.2** | Demonstrate skill in identifying vital information from resources in solving problems. |
| **PO2.3** | Demonstrate skill and appropriate technique and ingenuity in solving developmental or engineering problems. |
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| **PO3** | **Design/Development of Solutions** - Proffer solutions for developmental or complex engineering problems and design systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations |
| **PO3.1** | Demonstrate understanding of the impact of engineering decisions and solutions to societal issues. |
| **PO3.2** | Demonstrate understanding of solutions to cultural diversity based on our local context in Nigeria. |
| **PO3.3** | Demonstrate knowledge of the implications of engineering designs and solutions to the public health and safety of all. |
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| **PO4** | **Investigation** - Conduct investigation into developmental or complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions. |

| PO4.1 | Demonstrate ability to appropriately set-up and conduct experiment to understand and extract underlining and fundamental principles. |
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| PO4.2 | Demonstrate ability to apply statistical tools in designing and analyzing experiments. |
| PO4.3 | Demonstrate skill in applying the appropriate research method in solving engineering problems. |
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| PO5 | **Modern Tools Usage** - Create, select, and apply appropriate techniques, resources and modern engineering and ICT tools, including prediction, modelling and optimization to developmental and complex engineering activities, with an understanding of the limitations. |
| PO5.1 | Demonstrate an understanding of the inherent limitations of software (application) tools, and analytical and numerical techniques. |
| PO5.2 | Demonstrate ability to identify and apply appropriate technique in investigating and solving problems of engineering relevance. |
| PO5.3 | Demonstrate capability and proficiency in using modern and ICT tools to solve engineering problems. |
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| PO6 | **The Engineer and Society** - Apply reasoning informed by contextual knowledge including Humanities and Social Sciences to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice |
| PO6.1 | Demonstrate awareness of legal implications of professional engineering practice. |
| PO6.2 | Demonstrate understanding of the required contribution of engineers to the society. |
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| PO7 | **Environment & Sustainability** - Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development |
| PO7.1 | Demonstrate an understanding of the impact of engineering solutions on the society and environment. |

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| **PO7.2** | Demonstrate ability to recognize and evaluate the ethical dilemmas that may arise in the workplace. |
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| **PO8** | **Ethics** - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice, including adherence to the COREN Engineers Code of Conducts. |
| **PO8.1** | Demonstrate knowledge and understanding of the COREN Engineers Code of Conduct. |
| **PO8.2** | Demonstrate ability to apply professional responsibilities and norms of engineering practice. |
| **PO8.3** | Demonstrate understanding and appreciation of diversity. |
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| **PO9** | **Individual & Teamwork** - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. |
| **PO9.1** | Demonstrate knowledge and understanding in completing set goals and plan tasks |
| **PO9.2** | Demonstrate understanding in apply, using skills acquired to examine and adopt ideas as a member or team lead |
| **PO9.3** | Demonstrate the ability to work with other engineering discipline or multi-disciplinary settings |
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| **PO10** | **Communication** - Communicate effectively on developmental or complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO10.1** | Demonstrate the skills to communicate within the engineering society and outside engineering profession |
| **PO10.2** | Demonstrate the ability to make presentations and be able to communicate the society at large |
| **PO10.3** | Demonstrate the ability to use appropriate presentation medium for proper communication and receive clear instructions |

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| **PO11** | **Project Management & Finance** - Demonstrate knowledge and understanding of engineering, management and financial principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments |
| **PO11.1** | Demonstrate the ability to conduct, manage and execute projects in multi-disciplinary areas |
| **PO11.2** | Demonstrate the ability to work within the budget when executing a project for proper management |
| **PO11.3** | Demonstrate recognition or the skills needed for project management |
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| **PO12** | **Lifelong Learning** - Recognize the need for, and have the preparations and ability to engage in independent and lifelong learning in the broadest context of technological and social changes |
| **PO12.1** | Demonstrate the ability to learn new technology or techniques that will be used for solving life problems and professional development activities |
| **PO12.2** | Demonstrate the ability to apply the knowledge acquired from teaching, professional journals, and industry publications to improve processes and systems |

## POs to PEOs Mapping

Relationship of Student Outcomes to Program Educational Objectives:

a. It teaches the students the fundamental concepts of Computer Engineering with which they can build a career to the highest degree of professional competence;

b. It develops the students in the application of technical knowledge, sense of analysis, creative design abilities, innovation, adaptability, and leadership qualities;

c. It provides the students with the opportunity to develop a basic understanding of all areas of Computer Engineering practice and other special areas of interest; Telecommunication Engineering, System Planning, Microwave Engineering, Digital Image Processing, Mobile Communication, Satellite Communication, Optical Communication System and Information Theory & Coding.

d. It provides practical training in the industries and other Computer Engineering establishments in preparation for professional practice.

All the twelve programme outcomes are coded PO1 – PO12 and used to map the programme educational objectives coded PEO1 – PEO5. This is presented in Table 3. The programme outcomes were developed to link that of the regulatory body for engineering education in Nigeria (COREN) and further tied to ABET's outcomes. Furthermore, these programme outcomes have been adequately directed to achieve the desired impact of the curriculum in fulfilling the programme educational objectives.

Table 3: Link between the programme outcomes and the programme educational objectives

| Program Outcome (PO) | PEO1 | PEO2 | PEO3 | PEO4 | PEO5 |
|---|---|---|---|---|---|
| PO1: Engineering knowledge | ● | ● | | | |
| PO2: Problem Analysis | ● | ● | | | |
| PO3: Design /development of solutions | ● | ● | ● | ● | ● |
| PO4: Investigation | | | ● | ● | ● |
| PO5: Modern Tool Usage | | | ● | ● | ● |
| PO6: The Engineer and Society | ● | | ● | | |
| PO7: Environment & Sustainability | ● | | | ● | ● |
| PO8: Ethics | ● | | ● | | |
| PO9: Individual and Teamwork | ● | | ● | ● | ● |
| PO10: Communication | ● | ● | | ● | |
| PO11: Project Management and Finance | ● | ● | | ● | |
| PO12: Lifelong learning | | ● | | ● | |