

# **DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE**

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Re-accredited with 'A' Grade by NAAC, Accredited by

TCS Accredited by NBA (BME, ECE & EEE)

**PERAMBALUR – 621212.**



**Department of Biomedical Engineering**

**Value Added Courses**

## **Soft Skill Course**

**DURATION: 15 WEEKS**

**NO. OF HOURS: 30 (15 WEEKS)**

### **COURSE INTRODUCTION:**

The Soft Skill Certificate Course is designed to equip students with essential behavioral, communication, and professional competencies required in today's competitive and collaborative environments. Beyond technical knowledge, success in academics and careers depends on how effectively individuals communicate, adapt, and interact. This course aims to shape students into confident, responsible, and socially aware individuals capable of handling real-world professional challenges. The Soft Skill Certificate Course is designed to develop essential interpersonal and professional competencies required to succeed in academic, social, and workplace environments. The course focuses on shaping student behavior, mindset and communication approach, enabling them to interact confidently and effectively in diverse professional situations.

### **COURSE OVERVIEW:**

This course offers a structured framework to develop communication proficiency, interpersonal effectiveness, leadership orientation, and self-management abilities. It focuses on practical skill-building through guided activities, discussions, and scenario-based learning. Students are trained to understand professional expectations, workplace ethics, and collaborative practices while improving their ability to express ideas clearly and confidently in both formal and informal contexts. This course provides structured training in communication, self-management, teamwork, and professional conduct. It helps students understand how attitudes, behavior, and communication style influence personal and professional success. The course emphasizes practical exposure through discussions, activities, and simulations that reflect real-life workplace scenarios.

### **APPLICATIONS IN PROFESSIONAL AND ACADEMIC LIFE:**

Soft skills are essential in academic presentations, project collaborations, interviews, and professional interactions. This course enables students to actively participate in group discussions, deliver structured presentations, and communicate ideas persuasively. It also enhances listening skills, conflict resolution abilities, and professional etiquette, which are critical in team-based environments and organizational settings. Soft skills play a vital role in presentations, interviews, teamwork, leadership, and workplace collaboration. This course equips students to handle group discussions, professional meetings, public speaking, and decision-making situations. It also supports academic growth by improving clarity of expression, confidence, and interpersonal effectiveness in classroom and project environments.

### **CAREER AND PERSONAL DEVELOPMENT IMPACT:**

The course plays a significant role in personality enhancement by fostering self-confidence, emotional stability, and decision-making ability. Students learn to manage stress, maintain a positive attitude, and respond

effectively to workplace challenges. The training helps students build leadership qualities, ethical awareness, and adaptability, preparing them to function responsibly in dynamic professional environments. The course contributes significantly to personality development by enhancing self-awareness, emotional control, and confidence. Students learn to manage stress, adapt to changing environments, and respond constructively to challenges. These skills help students develop a professional identity and prepare them to handle responsibilities with maturity and discipline.

#### **STUDENT BENEFITS:**

Students develop clarity in communication, improved body language, and professional conduct. The course enhances time management, teamwork, and problem-solving skills while reducing hesitation and fear of public interaction. It supports holistic development by improving self-discipline, motivation, and interpersonal awareness, enabling students to perform confidently in academic and professional settings. Students gain improved communication abilities, stronger interpersonal relationships, and better self-presentation skills. The course fosters leadership qualities, teamwork spirit, and time management capabilities. It also helps students overcome hesitation, stage fear, and communication barriers, enabling them to perform confidently in professional settings.

#### **CAREER AND HIGHER STUDIES SUPPORT:**

The Soft Skill Certificate Course significantly improves employability by preparing students for interviews, group discussions, and professional assessments. The skills gained are transferable across all career paths, including corporate roles, higher education, research, entrepreneurship, and public service. For higher studies, the course strengthens presentation skills, academic communication, and collaborative research readiness. This course strengthens employability by preparing students for interviews, group discussions, and workplace interactions. It supports career advancement across all domains by developing transferable skills valued by employers and academic institutions.

### **Arduino Uno Controller & Internet of Things (IoT) using Biomedical Application**

**NO. OF DAYS: 10 Days**

**NO. OF HOURS: 7 Hrs/Day**

#### **COURSE INTRODUCTION:**

This course introduces students to the fundamentals of Arduino UNO microcontroller and Internet of Things (IoT) with a strong focus on biomedical engineering applications. It bridges electronics, programming, and healthcare technology, enabling students to design smart biomedical systems for real-time monitoring and medical assistance. This course is designed to introduce biomedical engineering students to the integration of embedded controllers and internet-based technologies in healthcare systems. By using Arduino UNO as a development platform, students gain exposure to how simple hardware and code can be transformed into intelligent biomedical solutions. The course focuses on understanding how data from the human body can be

sensed, digitized, and communicated securely for medical use.

## **Course Overview:**

The course covers the working principles of Arduino UNO, sensor interfacing, data acquisition, and wireless communication using IoT platforms. Students will learn to collect, process, and transmit physiological data such as heart rate, temperature, and oxygen levels. Emphasis is placed on practical implementation, system integration, and basic troubleshooting of biomedical IoT devices.

The curriculum progresses from basic microcontroller concepts to advanced IoT-enabled biomedical system design. Students will explore circuit design, firmware development, sensor calibration, and cloud-based data visualization. The course also introduces system reliability, real-time data handling, and safety considerations required in medical applications, ensuring students understand both technical and functional requirements.

## **APPLICATIONS IN BIOMEDICAL ENGINEERING:**

Arduino and IoT play a crucial role in modern healthcare systems.

### **Applications include:**

- Patient vital sign monitoring systems
- Smart wearable health devices
- Remote health monitoring and telemedicine
- Automated drug delivery and alert systems
- Medical equipment control and data logging

These technologies help improve accuracy, efficiency, and accessibility of healthcare services.

## **CAREER & PERSONAL DEVELOPMENT IMPACT:**

This course enhances technical skills such as embedded system design, problem-solving, and interdisciplinary thinking. It builds confidence in handling real-world biomedical challenges and promotes innovation. Students also develop analytical and teamwork skills essential for professional growth in healthcare technology fields.

This course encourages students to think beyond conventional medical devices and explore innovation-driven healthcare solutions. It strengthens logical reasoning, system-level thinking, and adaptability to emerging technologies. Students gain confidence in converting theoretical knowledge into functional prototypes, nurturing an entrepreneurial mindset and readiness for multidisciplinary work environments.

## **STUDENTS BENIFITS:**

- Hands-on experience with Arduino and IoT platforms
- Practical exposure to biomedical sensors and devices
- Improved understanding of smart healthcare systems
- Skill development in programming and electronics
- Increased employability in core and interdisciplinary roles.

## **CAREER AND HIGHER STUDIES SUPPORT:**

The course prepares students for careers in biomedical device companies, healthcare start-ups, R&D labs, and IoT-based medical industries. It also lays a strong foundation for higher studies in biomedical engineering, medical electronics, embedded systems, healthcare technology, and research-oriented programs. The knowledge gained from this course aligns with industry demands in medical technology, digital health, and smart healthcare systems. It supports career pathways in device development, system integration, clinical technology support, and research roles. For higher studies, the course builds a strong base for advanced learning in medical instrumentation, healthcare informatics, bioelectronics and interdisciplinary research programs.

### **Case-Based Learning on ECG Signal Acquisition and Interpretation**

#### **OBJECTIVE:**

The objective of implementing Case-Based Learning (CBL) was to bridge the gap between biomedical engineering concepts and real-world clinical applications by exposing students to authentic healthcare scenarios.

#### **DESCRIPTION:**

Students were provided with real clinical case scenarios related to cardiac disorders. Each case included patient history, ECG waveforms, and diagnostic challenges. Students analysed the cases individually and in groups to understand the role of biomedical instrumentation in diagnosis and monitoring.

#### **TEACHING-LEARNING PROCESS:**

- Pre-class exposure to ECG waveforms and clinical background
- In-class discussion of real patient scenarios
- Group-based analysis and interpretation
- Faculty-guided clarification linking theory with clinical practice

#### **EVENT OUTCOMES:**

The implementation of Case-Based Learning (CBL) in the topic of ECG Signal Acquisition and Interpretation resulted in significant academic and professional benefits for the students.

Through structured exposure to real-time clinical case scenarios, students developed a strong conceptual understanding of ECG instrumentation, signal characteristics, and physiological relevance. The analysis of actual ECG waveforms enabled students to correlate theoretical knowledge with practical diagnostic applications, thereby strengthening their core biomedical engineering foundation.

The activity enhanced students' critical thinking and analytical skills, as they were required to identify abnormalities, interpret waveform patterns, and understand the underlying biomedical and physiological causes. Group-based case discussions promoted collaborative learning, peer interaction, and effective communication, encouraging students to express technical ideas clearly and confidently.

By working on clinically relevant problems, students gained clinical awareness and problem-solving ability, which are essential for biomedical engineers working in hospitals, healthcare industries, and medical device companies. The event also improved students' ability to apply engineering principles to real-world healthcare challenges, bridging the gap between classroom learning and clinical practice.

Faculty facilitation during the sessions allowed for personalized guidance and immediate feedback, helping

students overcome conceptual difficulties and deepen their understanding. This learner-centred approach increased student engagement and motivation, leading to improved learning outcomes.

Overall, the Case-Based Learning event successfully fostered application-oriented learning, lifelong learning skills, and professional readiness, preparing students for internships, higher studies, and careers in the biomedical and healthcare sectors.

**OUTCOMES:**

- Improved understanding of biomedical instrumentation
- Enhanced clinical awareness and analytical skills
- Ability to apply engineering knowledge to healthcare problems
- Increased student engagement and confidence

**IMPACT:**

The Case-Based Learning approach helped students think like biomedical engineers in clinical environments, improving problem-solving ability and readiness for internships, industry, and higher studies.

**Case-Based Learning on ECG Signal Acquisition and Interpretation**

**OBJECTIVE:**

The objective of implementing Case-Based Learning (CBL) was to bridge the gap between biomedical engineering concepts and real-world clinical applications by exposing students to authentic healthcare scenarios.

**DESCRIPTION:**

Students were provided with real clinical case scenarios related to cardiac disorders. Each case included patient history, ECG waveforms, and diagnostic challenges. Students analysed the cases individually and in groups to understand the role of biomedical instrumentation in diagnosis and monitoring.

**TEACHING-LEARNING PROCESS:**

- Pre-class exposure to ECG waveforms and clinical background
- In-class discussion of real patient scenarios
- Group-based analysis and interpretation
- Faculty-guided clarification linking theory with clinical practice

**EVENT OUTCOMES:**

The implementation of Case-Based Learning (CBL) in the topic of ECG Signal Acquisition and Interpretation resulted in significant academic and professional benefits for the students.

Through structured exposure to real-time clinical case scenarios, students developed a strong conceptual understanding of ECG instrumentation, signal characteristics, and physiological relevance. The analysis of actual ECG waveforms enabled students to correlate theoretical knowledge with practical diagnostic applications, thereby strengthening their core biomedical engineering foundation.

The activity enhanced students' critical thinking and analytical skills, as they were required to identify abnormalities, interpret waveform patterns, and understand the underlying biomedical and physiological causes. Group-based case discussions promoted collaborative learning, peer interaction, and effective communication, encouraging students to express technical ideas clearly and confidently.

By working on clinically relevant problems, students gained clinical awareness and problem-solving ability, which are essential for biomedical engineers working in hospitals, healthcare industries, and medical device companies. The event also improved students' ability to apply engineering principles to real-world healthcare challenges, bridging the gap between classroom learning and clinical practice.

Faculty facilitation during the sessions allowed for personalized guidance and immediate feedback, helping students overcome conceptual difficulties and deepen their understanding. This learner-centred approach increased student engagement and motivation, leading to improved learning outcomes.

Overall, the Case-Based Learning event successfully fostered application-oriented learning, lifelong learning skills, and professional readiness, preparing students for internships, higher studies, and careers in the biomedical and healthcare sectors.

### **OUTCOMES:**

- Improved understanding of biomedical instrumentation
- Enhanced clinical awareness and analytical skills
- Ability to apply engineering knowledge to healthcare problems
- Increased student engagement and confidence

### **IMPACT:**

The Case-Based Learning approach helped students think like biomedical engineers in clinical environments, improving problem-solving ability and readiness for internships, industry, and higher studies.