APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

(A State Government University)

B. Tech. Curriculum 2024 - Objectives and Structure

MBA Block, College of Engineering, Thiruvananthapuram Campus

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CURRICULUM, B. Tech -2024

1. Objectives

The primary objective of the restructured curriculum for B. Tech students at APJ Abdul Kalam Technological University is to provide a comprehensive and future-oriented education. This education is designed to equip students with the essential knowledge, skills, and ethical values crucial for excelling in the dynamic realm of engineering. A key focus lies in integrating practical, hands-on experiences alongside exposure to computer programming, software development and vital facets of modern engineering.

This curriculum is not solely centered on producing technically proficient engineers; it aspires to foster socially responsible and innovative individuals. They should adeptly adapt to the evolving requisites of the engineering sphere and contribute meaningfully to both society and industry.

The specific objectives are as follows:

1. **Academic Inclusivity:**
    - Foster an inclusive learning environment that embraces diversity in all forms— be it cultural, socioeconomic or educational background.
    - Encourage participation and engagement from all students, ensuring equal opportunities for learning, growth, and contribution.
    - Implement inclusive teaching methodologies and support systems to accommodate diverse learning styles and needs, ensuring every student feels valued and has access to the resources necessary for academic success.
2. **Specialization in Engineering Disciplines:**
    - Enabling in-depth learning by offering a diverse array of engineering specializations.
3. **Mastery of Engineering Principles**:
    - Ensuring a robust foundation in Mathematics, Physics, Chemistry, and engineering fundamentals during the initial years, to equip students with the analytical prowess to effectively solve complex engineering problems.
4. **Interdisciplinary Knowledge:**
    - Incorporating courses that promote interdisciplinary learning and

collaboration.

5. **Alignment with Technological Advancements:**
    - To ensure that students are well-prepared for the rapidly evolving engineering landscape, the curriculum will incorporate courses focused on emerging technologies and current industry trends.
6. **Practical Skills Development:**
    - Providing hands-on experience through practical labs and Project-Based Learning (PBL) to prepare students for the practical demands of their chosen engineering field
7. **Communication and Teamwork Enhancement**:
    - Strengthening students' ability to communicate complex technical concepts and collaborate effectively in diverse teams, which are vital skills in the professional world.
8. **Accreditation and Industry Relevance**:
    - Aligning the curriculum with industry needs and accreditation standards to enhance employability and competitiveness in the job market.
9. **Global and Social Awareness:**
    - Raising awareness of global issues, public health, sustainability, and social responsibility to empower students to address environmental and societal challenges through engineering solutions.
10. **Ethical and Professional Development**:
    - Emphasizing the significance of ethical conduct and professional integrity in engineering practice.
11. **Critical Thinking and Problem-Solving**:
    - Developing students' critical thinking abilities, data analysis skills, and application of knowledge to real-world challenges through hands-on projects and case studies.
12. **Adaptability and Lifelong Learning:**
    - Equipping graduates for a dynamic job market by instilling a commitment to continuous learning and adaptability, enabling them to stay relevant and excel in their careers.
13. **Research and Innovation Promotion**:
    - Creating avenues for students to engage in research projects, innovation

competitions, and entrepreneurial ventures, positioning them at the forefront of technological advancements.

By adhering to these objectives, the new curriculum at APJ Abdul Kalam Technological University aims to produce well-rounded, competent, socially responsible, and ethically conscious engineers. These individuals are poised to lead, innovate, and positively impact society and the engineering profession. The commitment to academic inclusivity aims to create a welcoming and supportive atmosphere that harnesses the collective strengths of a diverse student body, enriching the educational experience for all.

2. Categorization of Engineering Branches at APJ Abdul Kalam Technological University

APJ Abdul Kalam Technological University, known for its diverse engineering programmes, offers a wide range of specializations within the field of engineering.

2.1 Grouping

APJ Abdul Kalam Technological University offers various engineering programmes that can be grouped into four broad categories based on their specialization.

2.1.1. Group A: Computer and Information Science

• Computer Science and Business Systems
• Computer Science and Design
• Computer Science and Engineering
• Computer Science and Engineering (Cyber Security) • Cyber Security • Cyber Physical Systems
• Computer Science and Engineering (Artificial Intelligence and Machine Learning) • Computer Science and Engineering (Artificial Intelligence) • Computer Science and Engineering (Artificial Intelligence and Data Science)
• Artificial Intelligence • Artificial Intelligence and Data Science • Artificial Intelligence and Machine Learning
• Computer Science and Engineering (Data Science) • Computer Science and Engineering (Internet of Things)

• Computer Science and Engineering (IoT) • Computer Science and Engineering (Internet of Things and Cyber Security including Block Chain Technology) • Computer Science and Engineering and Business Systems
• Information Technology

2.1.2. Group B: Electrical Science

• Electronics and Communication Engineering (ECE) • Electrical and Electronics Engineering (EEE) • Electronics and Communication (Advanced Communication Technology).
• Applied Electronics & Instrumentation Engineering • Biomedical Engineering • Electronics and Biomedical Engineering • Electronics and Instrumentation Engineering • Instrumentation and Control Engineering
• Electronics and Computer Engineering • Electrical and Computer Engineering
• Robotics and Artificial Intelligence • Robotics and Automation
• Electronics Engineering (VLSI Design and Technology)

2.1.3. Group C: Physical Science

• Civil Engineering • Mechanical Engineering • Chemical Engineering
• Aeronautical Engineering • Agriculture Engineering
• Automobile Engineering • Mechanical Engineering (Auto) • Mechanical Engineering (Automobile)
• Civil and Environmental Engineering
• Industrial Engineering
• Mechatronics Engineering

- Metallurgical and Materials Engineering
- Naval Architecture and Ship Building Engineering
- Production Engineering
- Polymer Engineering.
- Safety and Fire Engineering

2.1.4 Group D: Life Science and Agriculture Engineering

- Biotechnology
- Biotechnology and Biochemical Engineering
- Food Technology

3 PROGRAMME AND CREDIT STRUCTURE

There are four options for completing a B. Tech. Programme, as outlined below:

Table 1: *Credit Structure*

Options for 4-year B. Tech. Programme	Total Credits Required to Complete the Programme
"**B. Tech.**" in an Engineering Major Discipline.	**170** Credits [167 Academic Credits + 3 credits from student activities]
"B. Tech. with Minor" (Minor in any Discipline, other than the Major Discipline)	**185** Credits [170 Credits (B. Tech.) + 15 Credits for Minor Coursework]
"B. Tech. with Honours" (Specialization within the Major Discipline).	**185** Credits [170 Credits (B. Tech.) + 15 Credits for Honours Coursework]
"B. Tech. with Honours and Minor"	**200** Credits [170 Credits (B. Tech.) + 15 Credits for Honours Coursework+ 15 Credits for Minor Coursework]

4 CURRICULUM I TO VIII

Every course of B. Tech. Programme shall be placed in one of the ten categories as listed in table below. The curriculum offers flexibility in choosing elective courses for widening the understanding of emerging concepts and processes in different domains. The total credits for completing B. Tech in any of the engineering discipline is 170 credits.

Table 2: *Course classifications of the B. Tech Programmes and Overall Credit Structure*

Sl. No	Category	Code	Credits
1	Humanities and Social Sciences including Management Courses	HMC	9
2	Basic Science Courses	BSC	20
3	Engineering Science Courses	ESC	29
4	Programme (Professional) Core Courses	PCC	52
5	Programme (Professional) Core Courses-Project Based Learning	PBL	16
6	Program Elective Courses	PEC	18
7	Open Elective Courses/Industry Linked Elective	OEC/ILE	9
8	Mini Project, Project Work/Internship and Seminar	PWS	12
9	Health and Wellness	HWP	1
10	Skill Enhancement Courses	SEC	1
11	Mandatory Student Activities.	MSA	3
	Total Mandatory Credits	**170**	
12	Honours/Minor	H/M	15

A minimum of 120 Activity points is to be acquired for obtaining the 3 Activity Credits required in the curriculum.

Table 3: *B. Tech Semester Wise Credit Structure*

Semester	1	2	3	4	5	6	7	8	Credits
Credits	20	24	25	24	23	23	17	11	**167**
Credits for Activity Points	3								**3**
Grand Total									**170**

Sl. No	Category	S1	S2	S3	S4	S5	S6	S7	S8	Total
1	Humanities and Social Sciences including Management Courses	0	1	2	2	1	0	2	1	9
2	Basic Science Courses	7	7	3	3	0	0	0	0	20
3	Engineering Science Courses	12	11	4	0	0	2	0	0	29
4	Programme Core Courses	0	4	12	12	15	9	0	0	52
5	Programme Core Courses-PBL	0	0	4	4	4	4	0	0	16
6	Program Elective Courses	0	0	0	3	3	3	6	3	18
7	Open Elective Courses	0	0	0	0	0	3	3	3	9
8	Project work and Seminar	0	0	0	0	0	2	6	4	12
9	Health and Wellness /SEC	1	1	0	0	0	0	0	0	2
	Total Credits/Semester	**20**	**24**	**25**	**24**	**23**	**23**	**17**	**11**	**167**

4.1 Course Category and Course Type

The structure of the B. Tech Programme shall have the following Course Categories.

- **University Core (UC):** University Core (UC) courses are a compulsory set of courses for all B. Tech students, encompassing foundational subjects in Humanities, Skilling, and Computer Science. These courses are designed to provide a broad-based education and essential skills that are fundamental to the overall development of engineering students.
- **University Elective (UE):** These are elective courses from a basket of courses in the Humanities and Social Sciences. Such a UE course cannot be either UC / PC specified in their curriculum.
- **Group Core (GC):** Courses listed under Group Core of a curriculum are group specific.
- **Programme(Professional) Core Courses(PC):** Courses relevant to the chosen discipline/branch. The core courses shall be compulsorily studied by the student to fulfil the requirements of a programme. It contains theory only courses and lab only courses.
- **Project Based Learning (PBL):** For project-based courses, the student has to take up a project related to the course in consultation with the faculty concerned and complete the project within the semester.
- **Programme/Professional Elective Courses (PE):** A Programme Elective (PE) course in the B. Tech curriculum refers to a course that students can select from a specified set of options within their discipline or branch of study. These courses are

designed to enable students to tailor their education to their individual interests or career goals, offering an opportunity to delve deeper into specialized areas or broaden their knowledge within the field of Engineering and Technology. A minimum enrollment of 15 students is required to offer a professional elective course. However, this requirement does not apply if the total number of students admitted to the program is less than 15.

- **Open Elective Courses (OE):** Students belonging to a particular programme are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. These courses are meant to widen the student's knowledge beyond the parent discipline. The minimum number of students strength for offering an Open Elective course shall be 15.
- **Industry Linked Electives (ILE):** An industry-linked elective in a B. Tech curriculum is a specific course within the programme that is designed to provide students with practical knowledge and skills that are directly relevant to the needs and demands of the industry or the specific field of engineering they are studying. These electives are offered in collaboration with or input from industry experts and organizations/industrial partners. These electives are designed to bridge the gap between academic knowledge and real-world industrial applications. Students may have the option to choose from a range of industry-linked electives, allowing them to tailor their education to their specific interests and career goals.
- **Skill Enhancement Course (SEC):** These courses are aimed at providing students with additional tools and expertise that can complement their primary engineering education. The goal is to make students more well-rounded and better prepared for the demands of the professional world.
- **Engineering science Courses (ESC):** The students need basic engineering fundamentals to enhance breadth and depth of their understanding.

  Engineering Graphics, Basic Electrical, Basic Electronics, Basic Civil, Engineering Mechanics, Mechanical Engineering, Programming, Workshop etc.
- **Humanities and Social Sciences including Management courses (HMC):** English, Humanities, Professional Ethics, Management, Finance & Accounting, Life skills, Professional Communication, Economics etc .
- **Basic Science Courses (BSC):** Basic Science Courses in an engineering curriculum typically refer to foundational courses that provide students with a strong

understanding of fundamental scientific principles that underlie engineering applications. These courses are designed to establish a solid theoretical and conceptual groundwork for engineering students before they delve into more specialized and advanced topics within their chosen engineering discipline.

- **Health and Wellness (PW):** This subject focuses on promoting and enhancing the physical well-being of students through the integration of principles related to fitness, nutrition, and overall health. This subject is designed to provide students with knowledge and practical skills that contribute to a healthy and active lifestyle. This subject also addresses safety in both public places and engineering environments aims to provide students with comprehensive knowledge and skills related to ensuring public safety and minimizing risks in various engineering settings.

Table 4: *B. Tech Component Wise Distribution*

Main Curriculum Components	Sub Components	Credits	Total Credits	Number of Courses	Semesters
University Core (UC)	HMC	7	16	5	S1/S2, S3, S4, S5, S8
	BSC	0		0	
	ESC	7		2	S1, S2
	PW	1		1	S1/S2
	SEC	1		1	S1/S2
University Elective (UE)	HMC	2	2	1	S7
Group Core (GC)	BSC	20	42	6	S1, S2, S3, S4
	ESC	22		8	S1, S2, S3, S6
Programme Core Courses (PC)	Theory	38	80	10	S2, S3, S4, S5, S6
	Lab	14		8	S3, S4, S5, S6
	PBL	16		4	S3, S4, S5, S6
	Seminar/ Project (PWS)	12		3	S6,S7, S8
Programme Elective (PE)	PE	18	18	6	S4, S5, S6, S7, S8
Open Elective/ILE(OE/IE)	OE/IE	9	9	3	S6, S7, S8
Total Credits		**167**	**167**	**58**	

Table 5: *Overall Credit Structure- Comparison with B. Tech 2019 Curriculum*

Sl. No	Category	Code	No. of Courses (2019)	No. of Courses (2024)	Credits (2024)	Credits (2019)
1	Humanities and Social Sciences including Management courses	HMC	9	6	9	8
2	Basic Science courses	BSC	8(2 Labs)	6	20	26
3	Engineering Science Courses	ESC	6	6	20	20
4	Engineering Science Courses-Lab		2	2	2	2
5	Engineering Science Courses-AI and IPR		0	2	7	0
6	Programme (Professional) Core Courses- Theory	PCC	15	10	38	58
7	Programme (Professional) Core Courses- Project Based Learning	PBL	0	**4**	16	0
8	Programme (Professional) Core Courses- Lab		9	8	14	18
9	Program Elective Courses	PEC	5	**6**	18	15
10	Open Elective Courses/Industry Linked Elective	OEC /ILE	1	**3**	9	3
11	Project Work and Seminar	PWS	3	3	12	8
12	Comprehensive course work and Viva		2	0	0	2
13	Health and Wellness	PW	0	1	1	0
14	Skill Enhancement Courses	SEC	0	1	1	0
15	Mandatory Student Activities.	MSA			3	2
	Total Mandatory Credits				**170**	**162**
	Total Number of Courses		**60**	**58**		
	Honours/Minor	H/M			15	20

5 DEPARTMENTS

- Each course is offered by an academic department and their two-letter course prefix is given in Table 7

Table 7: *Departments and their codes*

SL No	Department	Course Prefix	SL No	Department	Course Prefix
1	Aeronautical Engineering	AN	30	Electronics and Communication Engineering	EC
2	Agriculture Engineering	AG	31	Electronics and Communication (Advanced Communication Technology)	EA
3	Applied Electronics and Instrumentation	AE	32	Electronics Engineering (VLSI Design and Technology)	EV

4	Artificial Intelligence	AI	33	Electronics and Computer Engineering	ER
5	Artificial Intelligence and Data Science	AD	34	Electronics and Instrumentation Engineering	EI
6	Artificial Engineering and Machine Learning	AM	35	Electrical and Computer Engineering	EO
7	Automobile Engineering	AU	36	Electrical and Electronics Engineering	EE
8	Biomedical Engineering	BM	37	Food Technology	FT
9	Biotechnology	BT	38	Humanities	HU
10	Biotechnology And Biochemical Engineering	BB	39	Industrial Engineering	IE
11	Chemical Engineering	CH	40	Information Technology	IT
12	Chemistry	CY	41	Instrumentation & Control	IC
13	Civil Engineering	CE	42	Mathematics	MA
14	Civil and Environmental Engineering	CV	43	Mechanical Engineering	ME
15	Computer Science and Business Systems	CB	44	Mechatronics	MR
16	Computer Science and Design	CN	45	Metallurgy	MT
17	Computer Science and Engineering	CS	46	Metallurgical and Materials Engineering	MM
18	Computer Science and Engineering and Business System	CU	47	Mechanical (Auto)	MO
19	Computer Science and Engineering (Artificial Intelligence)	CA	48	Mechanical Engineering (Automobile)	MU
20	Computer Science and Engineering (Artificial Intelligence and Machine Learning)	CM	49	Mechanical (Prod)	MP
21	Computer Science and Engineering (Artificial Intelligence and Data Science)	CR	50	Naval & Ship Building	NS
22	Computer Science and Engineering (Block Chain)	CK	51	Physics	PH

23	Computer Science and Engineering (Cyber Security)	CC	52	Polymer Engineering	PO
24	Computer Science and Engineering (Data Science)	CD	53	Production Engineering	PR
25	Computer Science and Engineering (Internet of Things)	CI	54	Physical Education	PW
26	Computer Science and Engineering (IoT)	CT	55	Robotics and Artificial Intelligence	RA
27	Computer Science and Engineering (Internet of Things and Cyber Security including Block Chain Technology)	CG	56	Robotics and Automation	RU
28	Cyber Physical Systems	CP	57	Biomedical and Robotics	BR
29	Electronics & Biomedical	EB	58	Safety & Fire Engineering	SF

6 CHALLENGE COURSES

“Challenge courses" or "Challenge exams" or “Credit by examination courses” are included in the B. Tech 2024 curriculum with the objective of allowing students to demonstrate their knowledge and competency in a particular subject and earn the academic credits, without completing the traditional coursework for the Continuous Internal Assessment (CIA). This approach intersects with the concept of "Recognition of Prior Learning" (RPL) or "Prior Learning Assessment and Recognition" (PLAR), which is a process that evaluates and recognizes an individual's relevant skills, knowledge, and experiences acquired outside of formal education. These courses allow students to demonstrate their knowledge and competency in a particular subject without completing the traditional coursework. Challenge courses can expedite the educational process, allowing students to focus on areas where they need further development.

The courses that can be attempted as Challenge courses are listed in the table below. A student can opt to attempt a Challenge course in the higher semester, from a preceding semester as per the table. If a student chooses to attempt a Challenge course from a lower semester, they are required to take the End Semester Examination (ESE) for that subject and secure the marks for a pass. The student will earn credits for successfully completing such

Challenge courses. However, itis important to note that the marks obtained in these courses will not contribute to any GPA calculations.

Table 8: *Eligible Challenge Courses and Semester Availability*

Sl. No.	Semester	Course Type	Course Title (Course Name)	Credits	Preceding Semester from where the Challenge courses can be taken
1	S2	BSC	Group Specific Mathematics-2	3	S1
2	S2	BSC	Physics for Engineers Chemistry for Engineers	4	S1
3	S2	ESC	Programming in C (Group A, B)	4	S1
4	S3	BSC	Group Specific Mathematics-3	3	S2
5	S4	BSC	Group Specific Mathematics-4	3	S3
6	S7	OE/PE	One OE and Two Level-3 PE Courses	3 (Credit/ Course)	S5/S6
7	S7	HMC	Elective	2	S4/S5/S6
8	S8	OE/PE	One OE and One Level-3 PE Courses	3 (Credit/ Course)	S5/S6/S7
9	S8	HMC	Organizational Behavior and Business Communication	1	S4/S5/S6/S7

7 MULTILEVEL COURSES

A multilevel course is a structured educational approach where course content is divided into sequential levels, each designed to build upon the knowledge and skills acquired in the previous one. This progression ensures a deepening of understanding and expertise in a specific subject or skill set.

The concept of multilevel courses is grounded in the philosophy of layered learning, where students are guided through increasingly complex material. This approach solidifies foundational concepts before advancing to more challenging topics, enhancing learning outcomes and preparing students for real-world engineering challenges.

As students' progress through these levels, they develop a comprehensive and nuanced understanding of the subject matter, equipping them with the necessary tools to excel in both academic and professional environments.

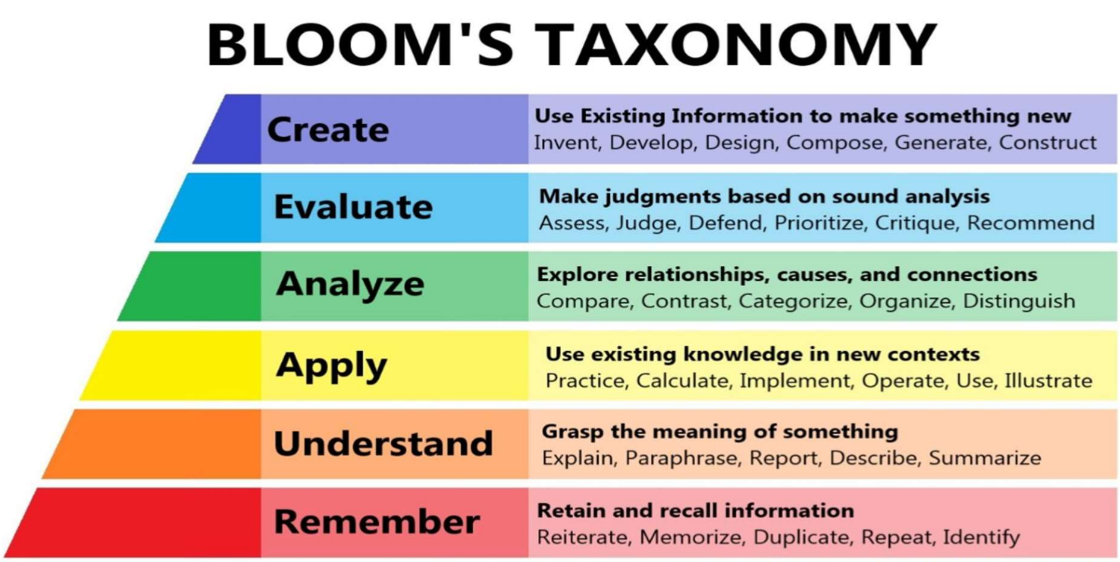
7.1 Course Structure:

Under the Programme Electives category, courses are offered at both Level 3 and Level 5.

i. Level 3 Courses: Focus primarily on the lower three levels of Bloom's taxonomy (Remember, Understand, and Apply). These courses carry 3 credits with three hours of classroom instruction per week. Assessment is conducted in the same manner as standard theory courses**.**

ii. Level 5 Courses**:** Level 5 courses in the B. Tech curriculum are designed to assess higher-order thinking skills, such as Analyze and Evaluate, in addition to the lower cognitive levels. These courses carry a total of 5 credits, consisting of 3 Programme Elective course credits and 2 additional credits. Each Level 5 course includes three hours of classroom instruction per week, with students also expected to dedicate an additional three hours per week to self-study. This self-study time is intended to support the development of higher-order thinking skills required for achieving the Analyze and Evaluate levels.

iii. For Level 5 courses, the lower three levels of Bloom's taxonomy are assessed through Continuous Internal Evaluation and End Semester Examination, while the higher levels are assessed through the Continuous Internal Evaluation component.



8 PROJECT BASED LEARNING(PBL)

Project-Based Learning (PBL) is an instructional strategy that empowers students with autonomy, engaging them in meaningful projects to learn, explore, and investigate. This methodology fosters active learning, encouraging students to apply knowledge and skills through hands-on experiences.

One of the primary advantages of PBL is its ability to cultivate ownership of learning. Students transition from passive receivers to active participants, identifying problems, crafting solutions, and applying knowledge in real-world contexts. This approach nurtures critical thinking, problem-solving, and decision-making abilities.

PBL also promotes teamwork and collaboration, essential skills for any professional. Students work together in teams, each contributing unique skills and perspectives to achieve a common goal. They learn how to communicate effectively, delegate tasks, and manage conflicts, all of which are crucial skills in the workplace.

Another key benefit of PBL is its alignment with the demands of modern workplaces. Employers seek professionals who can innovate, collaborate effectively, and tackle complex challenges. PBL equips students with these essential skills, ensuring they are well-prepared to navigate and excel in professional environments.

There are many variants of PBL as it can be modified according to domain or subject, individual course requirements or institute traditions, and can be implemented at a **chapter level, course level or even curriculum level.**

Broadly, every variant has two phases:

1. **Collaborative-learning phase**
2. **Self-directed learning phase.**

Collaborative -Learning Phase:

- Collaborative learning involves students working together in groups to achieve common learning goals or complete projects.
- Students share ideas, provide feedback, and support each other’s learning.
- The instructor often acts as a facilitator, guiding group activities and providing resources.

- Teachers may assign roles within groups to ensure participation and balanced workload.

Assessment: Assessment can include both group and individual contributions.

Self-directed learning phase:

- Self-directed learning involves **students taking the initiative** to diagnose their learning needs, set learning goals, identify resources, and evaluate their progress independently.
- The instructor provides initial support but allows students to guide their own learning, with assessment focusing on personal progress.

8.1 The Core Characteristics of PBL

Student-Centered Approach: PBL is centered around the student, with learners taking an active role in their education. They have the opportunity to make choices and take responsibility for their learning.

Learning occurs in small student groups: A group generally consists of four to six students who work together along with a tutor. The specific composition of the group may vary depending on the type of project and the skills required. The aim is to create a balanced group where each member brings unique strengths and perspectives. This number may also be decided based on the number of students in a class. Students share their knowledge and learn from others, and learning happens in collaboration.

Project/Problems form the organizing focus and stimulus for learning: Problems represent the challenges and provide the relevance and motivation for learning. Students realize what they will need to learn in order to solve the problem. The problem must motivate students to seek out a deeper understanding of concepts

Inquiry and Innovation: Students ask questions, conduct research, and use innovative thinking to solve problems. This fosters critical thinking and problem-solving skills.

Collaboration: PBL often involves teamwork, requiring students to collaborate with peers, instructors, and sometimes experts from the community. This builds communication and teamwork skills.

Public Presentation: Students typically present their projects to an audience, which can include classmates, teachers and community members. This helps develop public speaking and presentation skills.

Interdisciplinary Learning: Projects often span multiple subject areas, allowing students to make connections across disciplines and see the relevance of their learning in a broader context.

Extended Duration: Projects usually span over an extended period, allowing for deeper investigation and more thorough understanding of the subject matter.

Assessment: Assessment methods are varied and often include different rubrics, and performance-based tasks that reflect real-world evaluation methods.

8.2 Methodology

Group Analysis: Students form small groups to systematically analyze the given project or problem. They work together to reach a consensus on the meaning or implications of the problem, using relevant terms and concepts from the domain, subject, or topic.

Theory Construction and Identification of Learning Needs: The groups construct tentative theories explaining the phenomena or events described in the Project/problem. They identify known facts and determine what additional information is needed to solve the problem or complete the project. This process results in the formulation of learning issues, typically arising as questions from their discussions.

Resource Search and Self-Directed Learning: Students individually search for and evaluate resources that can help them understand the problem domain. They pursue these learning issues through self-directed study, utilizing a variety of resources such as books, articles, internet sites, and videos.

Group Review and Solution Proposal: Students reconvene in their tutorial groups to review and share what they have learned. They propose solutions and elaborate on different aspects of their findings. Together, they discuss and explore how their understanding of the problem or project has developed and address any remaining misconceptions.

Self and Peer Evaluation: Students engage in self-evaluation and peer evaluation, reflecting on their own contributions and assessing the contributions of others in the group.

8.3 Different Types of PBL Projects

There are several types of Project-Based Learning (PBL) projects, each with its unique characteristics and level of student autonomy. **PBL can also be considered as a model that organizes learning around projects.**

1. **Task Projects**:

- In task projects, students work on projects defined by the instructor. These projects provide minimal autonomy and may not stimulate significant motivation or skill development as the tasks are predetermined.

2. **Discipline Projects**:
    - The instructor defines the overall theme or topic/subject area of the project, but students have the freedom to choose specific aspects or elements to explore within that framework.
3. **Problem Projects**:
    - Problem projects offer the highest degree of autonomy to students. Here, students have almost complete freedom in choosing their project topics and deciding how to approach them. This level of autonomy fosters independence, creativity, and critical thinking as students navigate project planning and execution on their own.
4. **Service-Learning Projects:**
    - Service-learning projects combine academic learning with community service. Students work on projects that address real community needs or issues, applying their knowledge and skills to make a positive impact. This type of project fosters civic engagement, social responsibility, and empathy.

The ***choice of project type*** depends on the intended learning outcomes. For instance, if the goal is to provide students with hands-on project experience, task projects would be preferable. If the aim is to enhance students' content learning, discipline projects would be more suitable. For promoting autonomy, critical thinking, and problem-solving skills, complex projects are ideal. Moreover, interdisciplinary projects can engage students from various disciplines, fostering interdisciplinary knowledge development.

8.4 The Need for Introducing PBL Models in KTU Curriculum

The main motivations for implementing Project-Based Learning (PBL) include:

- **Industry Demand for Skilled Engineers**
- **Need for Change in Teaching-Learning Practices**
- **Newly Adapted Accreditation Norms**

As a result of globalization, professional engineers are expected to work in diverse international, social, and cultural environments. From a global employment perspective, the industry demands professionals to possess a comprehensive set of skills, including technical, personal, and social competencies. To meet these evolving industry demands, it is essential to introduce existing PBL models or develop new ones that can effectively equip our students with the necessary skills and knowledge.

PBL Course Elements

L: Lecture (3 Hrs.)	R: Project (1 Hr.), one faculty member for every twenty students		
	Tutorial	**Practical**	**Presentation**
Lecture delivery	Project identification	Simulation/ Laboratory Work/ Workshops	Presentation (Progress and Final Presentations)
Group discussion	Project Analysis	Data Collection	Evaluation
Question answer Sessions/ Brainstorming Sessions	Analytical thinking and self-learning	Testing	Project Milestone Reviews, Feedback, Project reformation (If required)
Guest Speakers (Industry Experts)	Case Study/ Field Survey Report	Prototyping	Poster Presentation/ Video Presentation: Students present their results in a 2 to 5 minutes video

Incorporating these elements into the lecture hour and project hours of a PBL course can create a dynamic and engaging learning environment, helping students to actively apply their knowledge and develop a wide range of skills.

To properly implement Project-Based Learning (PBL), faculty must first define appropriate learning outcomes and map these to learning activities and subject matter. The subject matter should be framed as a series of interconnected questions that guide the learning process. ***Student projects*** should be planned so that students encounter and address these questions during their project stages.

Here are some steps to effectively implement PBL:

Define Learning Outcomes: Clearly outline the learning outcomes you aim to achieve through PBL. Ensure these outcomes encompass the necessary technical, personal, and social competencies required by the industry.

Map Learning Activities: Align learning activities with the defined outcomes. Each activity should contribute to achieving these outcomes and help students develop the required skills and knowledge.

Interconnected Questions: Consider the subject matter as a series of interconnected questions. This approach guides students through the learning process, helping them understand the relationships between different concepts.

Central Idea or Principle: Choose a central idea, concept, or principle that is always taught in a given course. Identify a typical end-of-chapter problem or project that helps students learn this concept.

Real-World Context: Develop a real-world context for the chosen concept. Create a storytelling aspect for the end-of-chapter problem or research an actual case that can be adapted. This adds motivation for students to solve the problem or design the project.

Video Presentation: Students can present their results in a 2-to-5-minute video, allowing them to succinctly showcase their work and reflect on their learning process. This approach enhances students' communication and presentation skills while providing a creative platform to demonstrate their understanding and achievements.

Best Project Award: Awards given to the best projects at the end of each semester can further motivate students to put in their best effort and strive for excellence. This recognition fosters a sense of accomplishment and encourages healthy competition among students.

By following these steps, faculty can create a structured and engaging PBL environment that effectively equips students with the necessary skills and knowledge to meet the evolving demands of the industry.

8.5 Important Requirements and Evaluation Strategies

- **Introduction to Requirements and Evaluation:**

  At the beginning of the semester, it's essential to clearly explain the requirements and evaluation strategies for Project-Based Learning (PBL) to the students. This transparency helps students understand expectations, plan their work effectively, and strive for success. Here are the key elements to cover:

8.5.1 Requirements

1. **Project Scope and Objectives:**
   - Clearly define the scope and objectives of the projects. Explain what students are expected to achieve and the specific goals they should aim for.
2. **Project Phases and Milestones:**

- Break down the project into manageable phases or milestones. Provide a timeline with deadlines for each phase to help students manage their time effectively.

3. **Group Dynamics and Roles:**
   - Outline expectations for group work, including roles and responsibilities. Encourage students to leverage each member's strengths and contribute equally to the project.

4. **Research and Resources:**
   - Specify the types of resources students should use and any required research methodologies. Encourage diverse and credible sources of information.
   - Documentation and Reporting: Explain the documentation requirements, such as project proposals, progress reports, and final reports. Clarify the format, structure, and content expectations for each document.

5. **Presentation:**
   - Detail the requirements for presenting the project findings. This includes the format (e.g., PowerPoint, poster, Video), duration, and key elements to be covered in the presentation.

8.5.2 Evaluation Strategies

1. **Rubrics and Criteria:**
   - Provide detailed rubrics outlining the evaluation criteria. Explain how different aspects of the project (e.g., research quality, innovation, teamwork, presentation) will be assessed.

2. **Formative and Summative Assessment:**
   - Describe the balance between formative (ongoing) and summative (final) assessments. Highlight how continuous feedback will be provided and how it contributes to the final grade.

3. **Peer and Self-Assessment:**
   - Explain the process and importance of peer and self-assessment. Encourage honest and constructive feedback to help improve the quality of work and collaboration skills.

4. **Instructor Feedback:**

- Outline how and when the instructor will provide feedback. Ensure students understand the role of this feedback in guiding their progress and enhancing their learning experience.

5. **Participation and Engagement:**
   - Emphasize the importance of active participation and engagement throughout the project. Explain how attendance, contribution to group discussions/presentation, and proactive problem-solving will be evaluated.

8.6 Roles of a Teacher in PBL Courses

In Project-Based Learning (PBL) courses, the teacher's role extends beyond traditional teaching and evaluation. Depending on various situations, the teacher may need to assume different roles to support and guide students effectively.

1. **Resource Person:**
   - As a resource person, the teacher provides students with necessary information, tools, and resources. This could include suggesting useful references, offering insights into specific topics, or connecting students with experts.

2. **Consultant:**
   - In the role of a consultant, the teacher offers advice and guidance on project-related issues. This involves helping students think critically, troubleshoot problems, and refine their ideas and solutions.
3. **Mediator:**
   - When conflicts arise within groups due to differences in opinion or attitude, the teacher steps in as a mediator. The goal is to resolve conflicts, ensure respectful communication, and keep the group focused on the project.
4. **Learner:**
   - There may be situations where students present a problem that the teacher cannot immediately solve or answer. In such cases, the teacher must admit their own lack of knowledge and join the students in the learning process. This approach emphasizes humility and a commitment to continuous learning, demonstrating to students that it is acceptable not to have all the answers. The teacher, in these instances, must assume the role of a learner.

By adapting to these various roles, the teacher can effectively support students' learning journeys in PBL courses, ensuring they gain the skills and knowledge needed to succeed. The teacher's primary role is to guide students through each stage of their project. This includes facilitating discussions, encouraging critical thinking, and supporting decision-making processes. The teacher should not necessarily be an expert in the topic but should focus on fostering a collaborative and supportive learning environment.

8.7 Challenges of Project-Based Learning (PBL) in Practice

- Project-Based Learning (PBL) pedagogy cannot be clearly defined, as there are many models and diverse practices that satisfy PBL principles. Worldwide, the term PBL is used to describe a variety of educational practices, developed by considering local context, academic, and administrative culture. This diversity can create inconsistencies in how PBL is understood and applied, making it challenging to establish a standard definition.
- Not all students may be prepared or motivated to engage in PBL. Some may struggle with the increased autonomy and responsibility, while others may be resistant to deviating from conventional learning methods. Ensuring that students are adequately prepared and supported is crucial for successful PBL implementation.
- Assessing student performance in PBL can be complex due to the emphasis on process and collaboration rather than just the final product. Developing fair and effective assessment criteria that capture the breadth of student learning and contributions can be challenging.

In conclusion, project-based learning (PBL) is the most beneficial way for engineering students to learn. The key element driving PBL is the ‘project,’ which guides self-learning and problem-solving and, in turn, develops other critical skills.

By integrating PBL models into the KTU curriculum, we can better prepare our engineering students to meet the challenges of a globalized world. This approach will equip them with the comprehensive set of skills needed to thrive in diverse and dynamic professional environments.

PBL offers several advantages over traditional classroom learning, including increased student engagement, teamwork, critical thinking, and problem-solving skills, as well as practical experience that prepares them for the workplace.

9 COURSE CODING PATTERN

A course code in an engineering degree curriculum is a unique identifier assigned to a specific academic course. It is a combination of letters and numbers that serves as a shorthand reference for the course.

- Each course is denoted by a unique code consisting of Eight alphanumeric characters (Five alphabets followed by Three numerals).
  - Format: [YYXXCSNN]
  - Eg: **UCMAT201**
- The first five characters (YYXXC) will be alphabets, representing the course category (YY), name of the department (XX) offering that course followed by the nature of the course(C).
  - YY- University Core (**UC**), Group Core (**GC**), Programme Core (**PC**) etc.
  - XX- Computer Science (**CS**), Mechanical Engineering (**ME**), Mathematics (**MA**) etc.
  - C- Theory(**T**), Lab(**L**), Seminar(**S**), Project(**P**) etc.
  - The last three characters (SNN) will be digits, providing a unique numerical identifier for the course.
  - S- Semester Number (It can have a number from 1 to 8) in which the course is offered
  - NN- Course Sequence Number

This format aims to create a clear and consistent structure for course codes, making it easier for students, faculty, and administrative staff to identify and manage different courses within the university. These course numbers are to be given in the curriculum and syllabi.

For eg: GAPHT121- is a theory course offered by the physic department in the first semester for group A branch. PCMEL507 - is a Programme core laboratory course offered by the mechanical engineering department in the fifth semester. PBCST604 - is a project-based learning course offered by the computer science engineering department in the sixth semester. UCHUT703 is a university core theory course offered by the humanities department in the seventh semester.

- If a course is offered in two successive semesters, then the S and first N(Character in 7th place) will represent the semesters in which that particular course is offered. In this case, S will represent the lower semester and N will represent the higher semester.

For eg: **UCHUT345**-is a university core theory course offered by the humanities department in the third or fourth semester.

COURSE CODING

Course Category	Branch/Department Code	Codes for the nature of the Course	Semester Number	Identification Number for Each Course
YY	**XX**	**C**	**S**	**NN**
UC	HU, HW	T-Theory	1 to 8	01,02,03…….
UE		M-MOOC		
GA, GB, GC, GD, GY	CS, CE, EC, EE, ME, BT, MP, FT, MA….	L- Lab		
PC		S-Seminar		
PB		P-Project		
PE, OE/IE		J-Project Phase 2 I-Internship		
HN-Honours MN-Minor				

- T- Theory based courses (Other than the lecture hours, these courses can have tutorial, practical and project hours, e.g. L-T-P-R structures 3-1-0-0, 3-0-0-1, 3-0-0-0,2-0-2-0 etc.

- Course Category Code:

CODE	DESCRIPTION	EXAMPLE
GX	Group Core courses Common to Group A and Group B	GXCYT122
GY	Group Core courses Common to Group B and Group C	GYMAT101, GYMAT201
GZ	Group Core courses Common to Group C and Group D	GZPHT121, GZEST204
GM	Group Core courses Common to Group A, Group B and Group D	GMEST103
GN	Group Core courses Common to Group B, Group C and Group D	GNEST305

10 MINOR AND HONOURS COURSES

APJ Abdul Kalam Technological University (APJAKTU) offers specialized Honours and Minor courses as part of the B. Tech Curriculum 2024 to enhance the academic and professional competencies of its students. These courses provide an opportunity for students to gain deeper knowledge and expertise in specific areas of interest, beyond their major field of study.

10.1 Minor Courses

Objective:

The Minor courses aim to provide students with additional knowledge and skills in a secondary field of study, complementing their major discipline. This allows students to diversify their expertise and enhance their employability and interdisciplinary competencies.

10.1.1 Specialization Options:

Minors can be offered both in specialized areas (e.g., Data Science, AI, Robotics, IoT, AI and IoT, Robotics and AI, Entrepreneurship and Electric Vehicle Technology) or on a branch-wise basis (e.g., Minor in Mechanical Engineering for students majoring in Computer Science Engineering, "Bachelor of Technology in [CSE] with Minor in [ME]."**)**.

This flexibility allows students to either deepen their knowledge in an emerging field or gain broader technical skills in a different branch of engineering.

10.1.2 Industry Linked Minor (ILM)

Affiliated colleges have the option to offer Industry Linked Minors (ILMs) in collaboration with reputed industries, government agencies, and institutes of national importance. In such cases, the syllabus of the minor program must be scrutinized and recommended by the Board of Studies and subsequently approved by the Academic Council of the university. Evaluation of courses, excluding MOOC courses listed in the ILM curriculum, will be conducted at the college level.

Minors in specialized areas and industry linked minors can be offered by a single department or in collaboration with two or more departments

10.1.3 Credit Requirement for Minor

The student shall earn an additional 15 credits to be eligible for the award of a B. Tech. degree with a Minor.

10.1.4. Minor Course Distribution:

- The distribution of courses for the B. Tech. (Minor) program is structured to ensure a balanced and comprehensive acquisition of knowledge in the chosen minor discipline. The minor courses and credits are allocated across four semesters to progressively build the student's expertise:
    1. Semester 3: 4 Credits
    2. Semester 4: 4 Credits
    3. Semester 5: 4 Credits
    4. Semester 6: 3 Credits

Minor(Title)

Sl. No:	Semester	Course Code	Course Title (Course Name)	Credit Structure			SS	Total Marks		Credits	Hrs./ Week
				L	T	P		CIA	ESE		
1	3	MNXXT309	Course	3	1	0	5	40	60	4	4/5
				3	0	2	5.5				
2	4	MNXXT409	Course/	3	1	0	5	40	60	4	4/5
				3	0	2	5.5				
3	5	MNXXT509	Course/MOOC	3	1	0	5	40	60	4	4
4	6	MNXXT609	Course/MOOC	3	0	0	4.5	40	60	3	3
Total							**20/ 21**			**15**	**15/ 17**

XX: Branch/Department Code

- The courses offered in the third and fourth semesters can be structured as either theory-based courses or a combination of theory and lab-based courses.
- Upon completion of the program, students will be awarded a degree stating, "Bachelor of Technology in [Major] with Minor in [Minor]."

10.2 Honours Courses

Objective:

The Honours courses are designed for high-achieving students who wish to delve deeper into advanced topics within their major field of study. Completing these courses enables students to gain specialized knowledge and demonstrates their commitment to academic excellence.

10.2.1 Credit Requirement and Course Distribution for B. Tech. (Honours) Degree

i. Credit Requirement:

- The student shall earn additional 15 credits to be eligible for the award of B. Tech. (Honours) Degree.

ii. Course Distribution:

- 15 credits are distributed across four semesters to ensure a structured and progressive acquisition of knowledge in the Honours discipline.

1. Semester 4: 4 Credits
2. Semester 5: 4 Credits
3. Semester 6: 4 Credits
4. Semester 7: 3 Credits

Honours

Sl. No:	Semester	Course Code	Course Title (Course Name)	Credit Structure			SS	Total Marks		Credits	Hrs./ Week
				L	T	P		CIA	ESE		
1	4	HNXXT409	Course	3	1	0	5	40	60	4	4
2	5	HNXXT509	Course/MOOC	3	1	0	5	40	60	4	4
3	6	HNXXT609	Course/MOOC	3	1	0	5	40	60	4	4
4	7	HNXXT709	Course/MOOC	3	0	0	4.5	40	60	3	3
Total							**20**			**15**	**15**

XX: Branch/Department Code

11 INTERNSHIP FOR B. Tech STUDENTS

Internships are a crucial component of engineering education, bridging the gap between theoretical knowledge and practical application. They offer students invaluable exposure to real-world engineering practices, professional work environments, and industry standards.

11.1 Objectives

The primary objectives of incorporating internships into the B. Tech curriculum at KTU are to:

i. Provide hands-on experience in the engineering field.
ii. Develop professional skills and competencies.
iii. Enhance employability by aligning academic learning with industry requirements.

iv. Foster networking opportunities with industry professionals.

v. Encourage practical application of theoretical concepts learned in the classroom.

11.2 Guidelines for Offering of Long-Term Internship

i. The students can take the internship either in 7^{th}or in 8^{th} semester.

ii. Under no circumstances, internship can be done within the institute.

iii. Students are eligible to pursue internships upon the completion of their Sixth Semester End Semester Examination (ESE).

iv. Duration of Long-Term Internship: The internship period for the Long-Term Internship should last a minimum of 4 months but not exceed six months (4 to 6 months).

v. There should be no pending disciplinary action.

The industry internship included in the curriculum will give students the opportunity to apply their theoretical knowledge to practical situations and gain valuable experience.

The students can opt for Self-Study or Online Classes or MOOC courses corresponding to Professional Elective, Open Elective and HMC Courses during their 7^{th}/8^{th} semester, which will give them flexibility in doing internships.

11.3 Guidelines for Offering of Short-Term Internship

i. Students are allowed to pursue internships after the completion of their Fourth Semester University examination.

ii. Duration of Short-Term Internship: The period of the Internship shall be at least 4 weeks but not exceeding 8 weeks (4 to 8 weeks).

iii. There should be no pending disciplinary action.

iv. Under no circumstances, internship can be done within the institute.

12 Integration of Self-Study Hours and European Credit Transfer System in the B. Tech -2024 Curriculum

12.1 ECTS and Self-Study Hours

ECTS: The European Credit Transfer and Accumulation System (ECTS) is a standard adopted by higher education institutions in Europe to facilitate the recognition of academic qualifications and periods of study. ECTS plays a crucial role in promoting academic mobility and ensuring that students' educational achievements are universally acknowledged.

Self-Study (SS) Hours: In the context of an engineering curriculum, self-study hours refer to ***the amount of time students are expected to spend on independent learning activities outside of scheduled classroom instruction.*** These activities are essential for deepening understanding, reinforcing concepts learned in class, and developing critical thinking and problem-solving skills. Self-study hours are an integral part of the total workload for each course and contribute to achieving the learning outcomes.

Including ECTS and self-study hours in the new curriculum at APJ Abdul Kalam Technological University offers several significant benefits:

i. **International Recognition and Mobility**

- ***Standardization:*** ECTS is a standardized system used across European higher education institutions, facilitating the comparison of academic achievements and the transfer of credits between institutions internationally.
- ***Student Mobility:*** By adopting ECTS, *KTU students will find it easier to participate in <u>international exchange programs</u>, pursue higher studies abroad*, or transfer credits to institutions that recognize ECTS.

ii. **Quality Assurance**

- Including self-study hours in the curriculum design ensures that the courses are structured to foster independent learning and critical thinking, essential for professional and personal development.

iii. **Alignment with Global Standards**

- Aligning with international standards and practices enhances the reputation and credibility of KTU, attracting more students and partnerships globally.

iv. **Enhanced Employability**

- Integrating ECTS and self-study hours into the curriculum enhances its industry relevance by ensuring that graduates possess the skills and knowledge demanded by the job market.

v. **Transparent Workload Measurement**

- ***Comprehensive Learning Assessment:*** ECTS credits account for both contact hours (lectures, labs, etc.) and self-study hours, providing a more holistic measure of student workload.
- ***Student Planning:*** Students can better manage their time and plan their studies when they have a clear understanding of the total expected workload, including time for independent study.

12.2 Key Components of Self-Study Hours in an Engineering Curriculum

Homework and Assignments: Completing problem sets, written assignments, and projects that reinforce classroom learning.

Reading and Research: Reviewing textbooks, research papers, and supplementary materials to gain a deeper understanding of topics covered in lectures.

Project Work: Working on design projects, lab reports, and other practical assignments that require application of theoretical knowledge.

Preparation for Exams: Studying lecture notes, textbooks, and other resources to prepare for assessments.

Practical Skills Development: Practicing coding, simulation, or other technical skills necessary for engineering tasks and projects.

Independent Exploration: Exploring topics of personal or professional interest related to the course content to enhance understanding and stay updated with the latest developments in the field

1 ECTS credit point lies between 25 to 30 hours (except in the UK). The exact study hours vary depending on the country and can be categorized as follows-

Popular Countries	ECTS to Study Hours
Austria, Ireland, Italy, Malta, Spain	1 ECTS = 25 study hours
Finland, Lithuania, Sweden	1 ECTS = 27 study hours
Netherlands, Portugal	1 ECTS = 28 study hours
Germany, Belgium, Hungary, Rumania, Russia, Ukraine, Georgia	1 ECTS = 30 study hours
United Kingdom (UK)	1 ECTS = 20 study hours

For a full academic year, 60 ECTS credits will be assigned. Normally **30 credits are given for a semester.** The total workload of a study program in terms of ECTS points can be explained as–

- **Bachelor's degree** – usually ranges from 180 ECTS (3 years full-time) to 240 ECTS (4 years full-time).
- **Master's degree** – usually ranges from 60 ECTS (1 year full-time) to 120 ECTS (2 Years full-time).

12.3 APJAKTU credits to ECTS Conversion

The conversion of APJAKTU credits to ECTS is indeed a significant step for students planning to pursue higher education abroad. ECTS credits play a crucial role in streamlining the transfer process between universities, ensuring that students' academic progress seamlessly integrates into their educational journey. Understanding and embracing systems like ECTS are pivotal in the global education landscape, not only for facilitating smoother transitions but also for promoting international collaboration and harmonizing academic standards.

1. ***Formula For Calculating Total Study Hours:***

   Total Study Hours = (Number of hours/week) x (Number of weeks/semester)

   Number of hours/week = (L+T+P) hours/week + (Self Study hours) /week

2. ***Formula For Calculating Self Study (SS) Hours:***

   - SS Hours=1.5L+0.5 T+0.5P+R
     - L-T-P-R: Lecture-Tutorial-Practical-Project

3. ***Formula for calculating ECTS***

   The number of weeks per semester =15.

   Let 1 ECTS= 25 study Hours

   Total ECTS = Total Study hours / 25

12.4 ECTS Calculation: B. Tech 2024 scheme

- **<u>1 ECTS= 25 Study Hours</u>**
- **<u>Number of weeks/semesters= 15</u>**

Semester	L+ T+P (/Week)	Self-study Hours/Week (SS=1.5L +0.5T + 0.5P+R)	Total Study Hours/Year {(L+T+P+SS) x 15 weeks}	ECTS (Total Study Hrs/25)
1	25	30	825	33
2	28	34	930	37
3	27	31	870	35
4	26	31	855	34
5	24	30	810	32
6	25	32	855	34
7	22	26	720	29
8	16	20	540	22
Total ECTS				256

- ***This general formula can be used for calculating ECTS for a Programme, year, Semester or for a subject.***
- ***If a student requests ECTS for Honours or Minor course, then the same can be calculated using the above-mentioned formula.***

B. Tech Honours

Semester	L+ T+P (Week)	Self-study Hours/Week (SS=1.5L +0.5T + 0.5P+R)	Total Study Hours/Year {(L+T+P+SS)x 15 weeks}	ECTS (Total Study Hrs. /30)
4				
5				
6				
7				
			Total ECTS	

12.5 American Credit Transfer System

The American Credit Transfer System refers to the process and framework used by educational institutions in the United States to transfer academic credits between colleges and universities.

Conversion Between ECTS and American Credits

There is no official, universally accepted conversion formula, but a commonly used approximation is:

ACTS=ECTS/2

- **1 ECTS credit ≈ 0.5 American credit hours**
- **2 ECTS credits ≈ 1 American credit hour**

Semester	L+ T+P (/Week)	Self-study Hours/Week (SS=1.5L +0.5T + 0.5P+R)	Total Study Hours/Year {(L+T+P+SS) x 15 weeks}	ECTS (Total Study Hrs/25)	ACTS= ECTS/2
1	25	30	825	33	16.5
2	28	34	930	37	18.5
3	27	31	870	35	17.5
4	26	31	855	34	17
5	24	30	810	32	16
6	25	32	855	34	17
7	22	26	720	29	14.5
8	16	20	540	22	11
Total ECTS				**256**	**128**

Incorporating ECTS and self-study hours into KTU's new curriculum would align the university with global best practices, enhance the quality and flexibility of its educational programs, and better prepare students for international opportunities and professional success

13 Summary

By offering options for Project-Based Learning and incorporating University Core, Group Core courses, and internships, KTU aims to enhance students' practical skills, industry readiness, and comprehensive understanding of essential and specialized disciplines. This approach ensures a well-balanced education that prepares students for successful careers in engineering.