GURU KASHI UNIVERSITY

B.Tech. Computer Science & Engineering (Artificial Intelligence & Machine Learning with Quantum Computing)

(Single Major)

Session: 2025-26

Faculty of Engineering & Technology

Graduate Attributes of the Programme: -

Type of learning outcomes	**The Learning Outcomes Descriptors**
Graduates should be able to demonstrate the acquisition of:	
Learning outcomes that are specific to disciplinary/interdisciplinary areas of learning	The programme focuses to design and develop computer programs in the areas related to algorithm, networking, web design and cloud computing to understand, analyze, develop and efficiently solve problems related to computer-based systems.
Generic learning outcomes	The generic learning outcomes for graduates typically include: Problem Analysis, Design and Development, Modern Tool Usage, Lifelong Learning
	1.Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems 2.Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. 3.Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. 4.Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. 5.Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. 6.Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. 7.Understand the impact of the professional engineering solutions in societal and environmental

	contexts, and demonstrate the knowledge of, and need for sustainable development. 8.Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. 9.Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. 10.Communicate effectively on 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 11.Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. 12.Life-long learning**:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Learning outcomes: An Undergraduate Certificate is awarded to students who have demonstrated the achievement of the outcomes located at level 4.5:

Element of the Descriptor	**Programme learning outcomes relating to Undergraduate Certificate programme**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
	Understand about engineering applications and its importance in society.
	Understand programming Skills to solve simple numerical method problems.
	Identify, formulate and analysis of mathematics, natural sciences, and engineering sciences.
General, technical and professional skills required to perform and accomplish tasks	Design experiments and acquires data in order to explore physical principles, effectively communicate results, and evaluate related scientific studies.
Application of knowledge and skills	Development of tools for job-ready skills, and entrepreneurship skills.
Generic learning outcomes	Understanding of global change and sustainability while placing the development of physics.
Constitutional, humanistic, ethical, and moral values	Development of physics in its historical and cultural context.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Design new instruments for entrepreneurship skills with practical knowledge. Acquire necessary skills/hand on experience/ working knowledge on live projects and experiments.
Credit requirements	52
Entry requirements	A candidate who has passed Senior Secondary Certificate Examination (Class XII level) of the Board of School Education, Punjab; or any other examination recognized as equivalent thereto with minimum passing marks in aggregate, shall be eligible to join First Semester of the Undergraduate (UG) Programme.

Programme Structure

Semester:1st									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext.**	**Total Marks**
BAI1100	Engineering Physics	Major Core Course	3	0	0	3	30	70	100
BAI1101	Engineering Mathematics-I	Major Core Course	3	1	0	4	30	70	100
BAI1102	Engineering Physics Practical	Major Core Course	0	0	2	1	30	70	100
BAI1103	Engineering Graphics & Drawing	DSEC	4	0	0	4	30	70	100
BAI1104	Communication Skills-I	Ability Enhancement Course	2	0	0	2	30	70	100
VAC0001	Environment Educatio	VAC	2	0	0	2	30	70	100
BAI1105	Principle of Economics	Multidisciplinary Course	3	0	0	3	30	70	100
BAI1106	Basic Electrical Engineering	Minor Course	3	0	0	3	30	70	100
BAI1107	Basic Electrical Engineering Practical	Minor Course	0	0	2	1	30	70	100
BAI1108	Computer Proficiency	Skill Enhancement Course	2	0	0	2	30	70	100
BAI1109	Computer Proficiency Practical	Skill Enhancement Course	0	0	2	1	30	70	100
BAI1110	Entrepreneurship Setup & Launch	Skill Enhancement Course	0	0	4	2	30	70	100
Total			**22**	**1**	**10**	**28**	**360**	**840**	**1200**

Semester-2nd									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No of Credits**	**Int**	**Ext**	**Total Marks**
BAI2150	Engineering Chemistry	Major Core Course	3	0	0	3	30	70	100
BAI2151	Engineering Mathematics-II	Major Core Course	3	1	0	4	30	70	100
BAI2152	Engineering Chemistry Practical	Major Core Course	0	0	2	1	30	70	100
BAI2153	Communication Skills-II	Ability Enhancement Course	2	0	0	2	30	70	100
BAI2154	Manufacturing Practices	Skill Enhancement Course	0	0	6	3	30	70	100
BAI2155	Indian Constitution	Multidisciplinary	3	0	0	3	30	70	100
VAC0002	Human Value and Professional Ethics	VAC	2	0	0	2	30	70	100
BAI2156	Programming for Problem Solving	Minor Course	3	0	0	3	30	70	100
BAI2157	Programming for Problem Solving Practical	Minor Course	0	0	2	1	30	70	100
BAI2158	Entrepreneurship & Marketing Basics	Skill Enhancement Course	0	0	4	2	30	70	100
Total			**16**	**1**	**14**	**24**	**300**	**700**	**1000**

Programme learning outcomes: An Undergraduate Diploma is awarded to students who have demonstrated the achievement
of the outcomes located at level 5:

Element of the Descriptor	**Programme learning outcomes relating to Undergraduate Diploma programme**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Understand the advanced and latest manufacturing techniques being used in engineering industry
	Apply knowledge of reading & writing Language skills
	Identify, formulate and analysis of mathematics, natural sciences, and engineering sciences.
General, technical and professional skills required to perform and accomplish tasks	Ability to analyze situations and propose logical solutions.
	Reading & Writing reports, presenting ideas, and articulating thoughts clearly. Keeping up with new concepts and changes in technology or business practice
	Ability to find credible sources, analyze data, and synthesize information.
Application of knowledge and skills	Develop knowledge of applications of algorithms for the creation, insertion, deletion, searching and sorting of each data structure problem. Develop solutions for a range of problems using objects and classes.
Generic learning outcomes	Ability to Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.
Constitutional, humanistic, ethical, and moral values	Construct the ability to face difficult situations in life boldly and resolve them confidently.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Analyze and design various combinational and sequential circuits
Credit requirements	98
Entry requirements	A student can re-enter into second year of a programme if she/he has taken an exit option after first year(UG DIPLOMA in CSE-AI&ML)

Semester:3rd									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No of Credits**	**Int.**	**Ext.**	**Total Marks**
BAI3200	Object Oriented Programming Using C++	Major Core Course	3	0	0	3	30	70	100
BAI3201	Object Oriented Programming Using C++ (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI3202	Data Structure & Algorithms	Minor Core Course	3	0	0	3	30	70	100
BAI3203	Data Structure & Algorithms Practical	Minor Core Course	0	0	2	1	30	70	100
BAI3204	Professional Communication	Ability Enhancement Course	2	0	0	2	30	70	100
BAI3205	Numerical Methods and Analysis	DSEC	4	0	0	4	30	70	100
IKS0002	Indian Metallurgy	VAC	2	0	0	2	30	70	100
BAI3206	Sustainable Development	Multidisciplinary Course	3	0	0	3	30	70	100
BAI3207	Operations and Scale	Skill-Based Course	0	0	4	2	30	70	100
Elective Course -1 Skill Enhancement (Any one of the following)									
BAI3208	Digital Electronics	Skill Enhancement Course	2	0	0	2	30	70	100
BAI3209	Digital Electronics (Practical)		0	0	2	1	30	70	100
BAI3210	Disaster Risk Reduction and Management: Skills for Safety and Resilience		2	0	2	3	30	70	100
BAI3211	Basics of Cyber Security		3	0	0	3	30	70	100
Total			**19/20**	**0**	**10/11**	**24**	**330/300**	**770/700**	**1100/1000**

Semester: 4th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**	**Int.**	**Ext.**	**Total Marks**
BAI4250	Artificial Intelligence	Major Core Course	4	0	0	4	30	70	100
BAI4251	Operating System	Major Core Course	3	0	0	3	30	70	100
BAI4252	Operating System (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI4253	Python Programming	Major Core Course	3	0	0	3	30	70	100
BAI4254	Python Programming (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI4255	Discrete Mathematics	Vocational Core course	4	0	0	4	30	70	100
BAI4256	Report Writing	Ability Enhancement Course	2	0	0	2	30	70	100
IKS0012	Indian Agriculture	VAC	2	0	0	2	30	70	100
BAI4257	Organic Growth	Skill-Based Course	0	0	4	2	30	70	100
Discipline Specific Elective Course -1(Any one of the following)									
BAI4258	Computer Organization & Architecture	Discipline Specific Elective	4	0	0	4	30	70	100
BAI4259	Network Security								
Total			**22**	**0**	**8**	**26**	**300**	**700**	**1000**

Programme learning outcomes: An Bachelor of Vocational in CSE(AIML with Quantum Computing) awarded to students who have demonstrated the achievement of the outcomes located at level 5.5:

Element of the Descriptor	**Programme learning outcomes relating to 3year UG Degree programme**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	An understanding of and apply current theories, models, programming and techniques that provide a basis for the software lifecycle Development & Training.
	Discuss the basic concepts of open source platform to understand programming skills.
	Identify, formulate and analysis of mathematics, natural sciences, and engineering sciences.
General, technical and professional skills required to perform and accomplish tasks	Develop the logic ability in order to master your programming skills Software Product, Software crisis, Handling complexity through Abstraction and. Decomposition,
Application of knowledge and skills	Develop solutions for a range of problems using different computers based experimentation and analyze, interpret data.
Generic learning outcomes	Design & Develop different applications software of different programming language on different platforms. Organize web media objects using editing software Problem-Solving & Analytical Thinking. Develop an entrepreneurial mindset by identifying market problems and creating tech solutions.
Constitutional, humanistic, ethical, and moral values	Construct the ability to face difficult situations in life boldly and resolve them confidently.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Ability to have Technical Skills (Hard Skills) in different fields like cybersecurity, Web Development, App Development: Android. Software Development Life Cycle (SDLC) & Agile Methodologies. Hands-on experience with real-world projects
Credit requirements	146
Entry requirements	A student can re-enter into third year of a programme if she/he has taken an exit option after 2nd year(U.G Diploma in CSE(AI&ML with Quantum Computing)

Semester: 5th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**	**Int.**	**Ext.**	**Total Marks**
BAI5300	Java Programming	Major Core Course	3	0	0	3	30	70	100
BAI5301	Java Programming (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI5302	Relational Database Management System	Major Core Course	3	0	0	3	30	70	100
BAI5303	Relational Database Management System (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI5304	Web Designing & Development	Vocational Course	3	0	0	3	30	70	100
BAI5305	Web Designing & Development (Practical)	Vocational Course	0	0	2	1	30	70	100
BAI5306	Machine Learning	Major Core Course	3	0	0	3	30	70	100
BAI5307	AI Automation & Finance	Skill Based COurse	0	0	4	2	30	70	100
Discipline Specific Elective Course -II(Any one of the following)									
BAI5308	Soft Computing	**Discipline Elective Course**	4	0	0	4	30	70	100
BAI5309	Software Engineering								
Discipline Specific Elective Course -III (Select any subject with its Practical.)									
BAI5310	Introduction to Quantum Computing	**Discipline Elective Course**	3	0	0	3	30	70	100
BAI5311	Quantum Programming (Practical)		0	0	2	1	30	70	100
BAI5312	Computer Graphics		3	0	0	3	30	70	100
BAI5313	Computer Graphics (Practical)		0	0	2	1	30	70	100
Total			**20**	**0**	**12**	**25**	**330**	**770**	**1100**

Semester: 6th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**	**Int.**	**Ext.**	**Total Marks**
BAI6350	Formal Language & Automata Theory	Major Core Course	4	0	0	4	30	70	100
BAI6351	Deep Learning	Major Core Course	4	0	0	4	30	70	100
BAI6352	Computer Networks	Major Core Course	4	0	0	4	30	70	100
BAI6353	Design & Development of Applications	Vocational Course	3	0	0	3	30	70	100
BAI6354	Design & Development of Applications (Practical)	Vocational Course	0	0	2	1	30	70	100
Discipline Specific Elective Course -IV(Any one of the Following									
BAI6355	Quantum Communication and Cryptography	**Discipline Elective**	4	0	0	4	30	70	100
BAI6356	Internet of Things (IoT)								
Discipline Specific Elective Course -V(Any one of the Following									
BAI6357	Digital Forensics	**Discipline Elective**	4	0	0	4	30	70	100
BAI6358	Foundation of Blockchain Architecture Design								
Total			**23**	**0**	**2**	**24**	**210**	**490**	**700**

Element of the Descriptor	**Programme learning outcomes relating to Bachelor's Degree**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Understanding of advanced computer science concepts, industry trends, and research-oriented knowledge.
	focuses on specialization, innovation, and career preparation.
General, technical and professional skills required to perform and accomplish tasks	Advanced technical expertise, professional skills, and general competencies that prepare them for jobs, research, and entrepreneurship.
Application of knowledge and skills	Apply their theoretical knowledge and technical skills to real-world projects, industry-oriented tasks, research, and innovation.
Generic learning outcomes	Students will be Advanced Technical Proficiency. Project Management and Team ColPracticaloration skill. Recognizing the rapid evolution of technology, students should be prepared for continuous learning and professional development throughout their careers.
Constitutional, humanistic, ethical, and moral values	Construct the ability to face difficult situations in life boldly and resolve them confidently.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Ability to have Technical Skills (Hard Skills) in different fields like cybersecurity, Web Development, App Development: Android. Software Development Life Cycle (SDLC) & Agile Methodologies. Hands-on experience with real-world projects.
Credit requirements	190
Entry requirements	A student can re-enter into Fourth year of a programme if she/he has taken an exit option after 3rd year(B.Voc in CSE-AL&ML with Quantum Computing).

Semester:7th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No of Credits**	**Int.**	**Ext.**	**Total Marks**
BAI7400	Introduction to Cloud Computing	Major Core Course	4	0	0	4	30	70	100
BAI7401	Natural Language Processing	Major Core Course	3	0	0	3	30	70	100
BAI7402	Natural Language Processing (Practical)	Major Core Course	0	0	2	1	30	70	100
BAI7403	Big Data	Major Core Course	4	0	0	4	30	70	100
BAI7404	Introduction to Robotics	Minor Course	4	0	0	4	30	70	100
BAI7405	Project (Experiential Learning)	Minor Course	0	0	4	2	30	70	100
Discipline Specific Elective Course -VI (Select any subject with its Practical.)									
BAI7406	Quantum Computing Applications and Project	**Discipline Elective**	3	0	0	3	30	70	100
BAI7407	Quantum Simulation Practical		0	0	2	1	30	70	100
BAI7408	Computer Vision		3	0	0	3	30	70	100
BAI7409	Computer Vision (Practical)		0	0	2	1	30	70	100
Total			**18**	**0**	**08**	**23**	**240**	**560**	**800**

Semester: 8th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No of Credits**	**Int.**	**Ext.**	**Total Marks**
BAI8450	Internship	Skill Based	0	0	0	20	30	70	100
Total			0	0	0	20	30	70	100
Grand Total			**140**	**2**	**63/64**	**193/194**	**2070/2100**	**4830/4900**	**6900/7000**