UNDERGRADUATE PROSPECTUS
2022

SUPPLEMENT FOR
BS (Computer Science)
With Specializations in:
- Artificial Intelligence (AI)
- Data Science (DS)
- Cyber Security (CY)

NED UNIVERSITY
OF ENGINEERING & TECHNOLOGY

www.neduet.edu.pk

1. BS Computer Science with Specialization in Artificial Intelligence

Artificial Intelligence (AI) is a branch of computer science that enables machines to perform tasks which require human intelligence like vision, language translation, decision making, and others. Due to rapid development in AI techniques and their promising performance, AI in itself has become a broad field which is further divided into different branches like computer vision, natural language processing, speech recognition, etc. Keeping in mind the importance and impact of this field in various sectors such as health, agriculture, military, finance, transportation, e-commerce, etc., and an increase in market demand for AI experts, the CSIT department of NED University of Engineering and Technology has introduced the BS Computer Science program with specialization in Artificial Intelligence. This program has been meticulously designed to equip students with all the skills required to hone this ground-breaking technology.

This program provides students an in-depth knowledge of tools and techniques developed for either solving complex problems or for automating labor intensive tasks, which does not only enable students to write efficient algorithms, but also ensures sound mathematical foundation to work through complex AI algorithms and create optimized and efficient AI models.

The curriculum for this program includes courses mainly related to calculus, linear algebra, probability and statistics, programming, data structure, algorithms, database, logic and reasoning, machine learning, artificial neural networks, reinforcement learning, computer vision, natural language processing, ethics, and other related courses. The students can also opt for a few courses related to applications of AI in sectors like bioinformatics, robotics, information security, autonomous vehicles and others.

2. BS Computer Science with Specialization in Data Science

Due to the rapid proliferation of social networks and development of Internet-of-things (IoT) devices, wherever we see, there's a plethora of data, termed as Big Data, which can be utilized for designing efficient predictive models, approximated functions, anomaly detectors, filters, etc. Moreover, over the time, the computational power of the machines has been increased which can be utilized for analysis of Big Data.

Therefore, the researchers, scientists, and stakeholders have started shifting to data-driven approaches for developing data-products like recommendation engines, spam filters, anti-viruses, autonomous driving, space exploration, disease diagnosis at early stages, drug development, etc.

In the recent past, the data science has been ranked as the fastest growing field globally and has witnessed a tremendous growth. Looking at an increase in the market demand for data engineers, data analysts, and data scientists, the CSIT department of NED University has introduced the BS Computer Science program with specialization in Data Science. This program produces individuals who are able to collect and transform raw data into a useful format, extract useful insights, find hidden patterns, and develop data products which can add value to the businesses.

The curriculum for this program is designed to equip students with the cutting-edge skills required to satisfy the global demand for Data Scientist roles and thus build a rewarding career. The graduates of this program will not only be able to design software by applying mathematical and scientific principles, but will also be equipped with knowledge and skills of data science, ranging from data acquisition, integration, storage, analysis and visualization of data. Students will also learn about data mining, statistical analysis, and machine learning by working collaboratively with academics and businesses, applying practice-based skills to real-life case studies and projects.

3. BS Computer Science with Specialization in Cyber Security

In today's digital world, cyber security has become a critical component of every organization's sustainability, security and growth strategy. With an increasing number of users, devices and programs in the modern enterprise, combined with the increased deluge of highly valuable confidential data, the importance of cybersecurity continues to grow. The growing volume and sophistication of cyber attackers and attack techniques compound the problem even further. The need for cybersecurity professionals has been growing rapidly, even faster than companies can hire—and that demand is expected to continue. Realizing the rising demand for cyber security professionals, the CSIT department of NED University has introduced the BS Computer Science program with specialization in Cyber Security.

This program is designed to prepare the next generation of cybersecurity professionals to protect and defend industry, government and military data and networks. This well-planned program takes the student through the rigorous process of becoming the best cyber security professionals to keep organizations absolutely cyber-secure. Keeping in view the nature of this critical program, there's no stone left unturned in order to ensure the students get the best and the quality education and training to be able to take the adversaries head-on.

The curriculum for this program is designed to cover the core knowledge areas of computer science with foundational cyber security concepts that will enable graduates to succeed in meeting the emerging cyber security challenges. Students will be trained in the arts and skills of cyber security which includes subjects on cryptography, computer security, network security, ethical hacking, secure programming, information security assurance, as well as network penetration and countermeasures.

4. FEE STRUCTURE:

i.	Admission Fee	Rs.	39,000.00
ii.	Semester Fee	Rs.	36,310.00
iii.	Student Facilitation Charges	Rs.	5,390.00
iv.	University Endowment Fund	Rs.	300.00
	TOTAL FEE	**Rs.**	**81,000.00**

Self-Finance Fee:

Self-Finance Fee must be paid in designated branches of the bank and copy of receipt/ challan enclosed with application form; which shall not be refunded if admitted under the scheme on payment of Fee and Charges mentioned in Para 4.

   i)   Categories SF-1 to SF-5   Rs. 775,000/- + Tax* for all disciplines.
   ii) Categories SF-6 to SF-11   Rs. 975,000/- + Tax*

NB: + 5% Tax* shall be required to be deposited in designated branch of the banks as Self Finance Fee for admission.

   *** *Advance Tax on Payment of Fee for Educational Institutions [Section 236(i)]***
   As per newly inserted Section 236(i) of Finance Act every Educational Institution is required to collect advance income tax at the rate of 5% on the amount of fee paid to an educational institution. The person responsible for preparing monthly, bimonthly or quarterly fee voucher or challan shall also charge withholding tax in case the fee exceeds Two Hundred Thousand Rupees annually.

   iii) Candidates applying against more than one category under Self Finance Scheme may only deposit Self Finance Fee for any one category. In case of difference in amount of Self Finance, the highest amount needs to be deposited.

5. SEAT DISTRIBUTION:

REGULAR SCHEME				
Category	CT (AI)	CT (DS)	CT (CY)	Total
HSC (Pre-Engineering/Computer Science) from Board of Intermediate Education, Karachi.				
R-1(a)	19	18	19	56
HSC (Pre-Medical) from Board of Intermediate Education, Karachi.				
R-1(b)	1	1	1	3
HSC (Pre-Engineering/Computer Science) from Board of Intermediate Education, Hyderabad				
R-2(a)	1	1	0	2
HSC (Pre-Engineering/Pre-Medical/Computer Science/Commerce/Arts) from Federal Board of Education, Islamabad				
R-3(a)	1	1	1	3
HSC (Pre-Engineering/Computer Science) from Aga Khan Board				
R-3(b)	3	3	3	9
HSC (Pre-Medical) from Aga Khan Board				
R-3(d)	1	1	0	2
HSC (Pre-Engineering/Pre-Medical/Computer Science/Commerce/Arts) from Ziauddin Board				
R-3(e)	0	1	1	2
A-Level (Pre-Engineering/Computer Science) Institutions located in Pakistan				
R-4(a)	3	3	3	9
12th Grade & Equivalent (Pre-Engineering/Pre-Medical/Computer Science/Commerce/Arts)				
R-4(c)	0	0	1	1
A-Level (Pre-Medical)				
R-4(d)	1	1	1	3
Real Son/Daughter of University Teachers				
R-7(a)	1	1	1	3
Real Son/Daughter of University Non-Teaching Staff				
R-7(b)	1	1	1	3
TOTAL	**32**	**32**	**32**	**96**

SELF FINANCE SCHEME				
Category	CT (AI)	CT (DS)	CT (CY)	Total
HSC (Pre-Engineering/Computer Science) from Board of Intermediate Education, Karachi.				
SF-1(a)	4	4	4	12
HSC (Pre-Engineering) from Board of Intermediate Education, Hyderabad				
SF-2(a)	1	0	1	2
HSC (Pre-Engineering) from Board of Intermediate Education, Mirpurkhas				
SF-2(b)	0	1	1	2
HSC (Pre-Engineering) from Board of Intermediate Education, Sukkur				
SF-2(c)	1	1	0	2
HSC (Pre-Engineering) from Board of Intermediate Education, Larkana				
SF-2(d)	0	1	1	2
HSC (Pre-Engineering/Computer Science/Commerce/Arts) from Board of Intermediate Education, Nawabshah				
SF-2(e)	1	0	0	1
HSC (Pre-Engineering) from Federal Board of Education, Islamabad from an institute located in Pakistan				
SF-3(a)	1	1	1	3
HSC (Pre-Engineering) from Aga Khan Board				
SF-3(b)	1	1	1	3
A-Level (Pre-Engineering) Institutions located in Pakistan				
SF-4(a)	2	2	2	6
Real Sons and daughters of NEDAN Life Members				
SF-8	1	1	1	3
Real Sons and daughters of Expatriate Pakistanis				
SF-9(c)	1	1	1	3
Sponsors Seats				
SF-11	5	5	5	15
TOTAL	**18**	**18**	**18**	**54**

6 Bachelor of Science Programmes

6.1 Artificial Intelligence

FIRST YEAR

Course Code	Fall Semester — Course Title	Th	Pr	Total	Course Code	Spring Semester — Course Title	Th	Pr	Total
CT-175	Programming Fundamentals	3	1	4	CS-251	Logic Design & Switching Theory	3	1	4
CT-174	Fundamentals of Information Tech.	2	1	3	CT-162	Discrete Structures	3	0	3
MT-171	Differential & Integral Calculus	3	0	3	CT-260	Object Oriented Programming	3	1	4
PH-122	Applied Physics	3	1	4	HS-104	Functional English	3	0	3
HS-205	Islamic Studies OR	2	0	2	HS-105	Pakistan Studies OR	2	0	2
HS-209	Ethical Behaviour (for Non-Muslims)				HS-127	Pakistan Studies (for Foreigners)			
MT-001	Mathematics-1 (for Pre-Medical)	-	-	NC	HSK-I	Chinese Language OR	-	-	NC
					HS-231	Turkish Language-I			
					MT-002	Mathematics-2 (for Pre-Medical)	-	-	NC

SECOND YEAR

Course Code	Fall Semester — Course Title	Th	Pr	Total	Course Code	Spring Semester — Course Title	Th	Pr	Total
CT-159	Data Structure Algorithms & Applications	3	1	4	CS-252	Computer Architecture & Organization	3	1	4
MT-227	Differential Equations	3	0	3	CT-261	Database Management Systems	3	1	4
HS-115	Academic Reading & Writing	3	0	3	HS-218	Business Communication	2	1	3
HS-219	Professional Ethics	2	0	2	CT-258	Financial & Cost Accounting	3	0	3
CT-259	System Analysis & Design	3	0	3	MT-272	Linear Algebra & Geometry	3	0	3
HSK-II	Chinese Language OR	-	-	NC	HS-200	Community Service	-	-	NC
HS-232	Turkish Language-II								

THIRD YEAR

Course Code	Fall Semester — Course Title	Th	Pr	Total	Course Code	Spring Semester — Course Title	Th	Pr	Total
CT-361	Artificial Intelligence & Expert Systems	3	1	4	CT-354	Machine Learning	3	1	4
CT-351	Knowledge Representation & Reasoning	3	0	3	CS-351	Computer Communication Networks	3	1	4
CT-353	Operating Systems	3	1	4	CS-428	Parallel & Distributed Computing	3	1	4
CT-###	AI Elective I	3	0	3	CT-363	Design and Analysis of Algorithms	3	0	3
CT-365	Software Engineering	3	0	3	CT-###	AI Elective II	3	0	3

Elective-I and Elective – II			
CT-356 Data Mining	3	0	3
CT-357 Speech Processing	3	0	3
CT-358 Fuzzy Systems	3	0	3
CT-359 Knowledge Based Systems	3	0	3

FINAL YEAR

Course Code	Fall Semester — Course Title	Th	Pr	Total	Course Code	Spring Semester — Course Title	Th	Pr	Total
CT-499	*Software Based Project	0	3	3	CT-499	Software Based Project	0	3	3
CT-466	Artificial Neural Networks	3	0	3	CT-355	Information Security	3	0	3
CT-485	Natural Language Processing	3	0	3	CT-467	Image Processing & Computer Vision	3	1	4
CT-###	AI Elective III	3	0	3	MG-481	Entrepreneurship	3	0	3
MG-482	Organisational Behaviour	3	0	3	CT-###	AI Elective IV	3	0	3

Elective-III and Elective – IV			
CT-468 Deep Learning	3	0	3
CT-469 Reinforcement Learning	3	0	3
CT-470 Swarm Intelligence	3	0	3

Duration one academic year: Requires literature survey and preliminary work during this Semester

6.2 Data Science

FIRST YEAR

Fall Semester				Spring Semester			
Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total

Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-175	Programming Fundamentals	3	1	4	CS-251	Logic Design & Switching Theory	3	1	4
CT-174	Fundamentals of Information Tech.	2	1	3	CT-162	Discrete Structures	3	0	3
MT-171	Differential & Integral Calculus	3	0	3	CT-260	Object Oriented Programming	3	1	4
PH-122	Applied Physics	3	1	4	HS-104	Functional English	3	0	3
HS-205	Islamic Studies OR	2	0	2	HS-105	Pakistan Studies OR	2	0	2
HS-209	Ethical Behaviour (for Non-Muslims)				HS-127	Pakistan Studies (for Foreigners)			
MT-001	Mathematics-1 (for Pre-Medical)	-	-	NC	HSK-I	Chinese Language OR	-	-	NC
					HS-231	Turkish Language-I			
					MT-002	Mathematics-2 (for Pre-Medical)	-	-	NC

SECOND YEAR

Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-159	Data Structure Algorithms & Applications	3	1	4	CS-252	Computer Architecture & Organization	3	1	4
MT-227	Differential Equations	3	0	3	CT-261	Database Management Systems	3	1	4
HS-115	Academic Reading & Writing	3	0	3	HS-218	Business Communication	2	1	3
HS-219	Professional Ethics	2	0	2	CT-258	Financial & Cost Accounting	3	0	3
CT-259	System Analysis & Design	3	0	3	MT-272	Linear Algebra & Geometry	3	0	3
HSK-II	Chinese Language OR	-	-	NC	HS-200	Community Service	-	-	NC
HS-232	Turkish Language-II								

THIRD YEAR

Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-368	Fundamentals of Data Science	2	1	3	CT-356	Data Mining	3	1	4
MT-331	Probability & Statistics	3	0	3	CT-xxx	Data Science Elective-II	3	0	3
CT-xxx	Data Science Elective – I	3	0	3	CS-351	Computer Communication Networks	3	1	4
CT-365	Software Engineering	3	0	3	CT-363	Design & Analysis of Algorithms	3	0	3
CT-361	Artificial Intelligence & Expert Systems	3	1	4	CT-353	Operating Systems	3	1	4

Elective-I and Elective – II			
CT-354	Machine Learning	3	0	3
CT-357	Speech Processing	3	0	3
CT-369	Business Process Analysis	3	0	3
CT-370	Platform & Architecture for Data Science	3	0	3

FINAL YEAR

Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-499	*Software Based Project	0	3	3	CT-499	Software Based Project	0	3	3
CT-xxx	Data Science Elective-III	3	0	3	CT-471	Data Analysis & Visualisation	3	1	4
CT-472	Data Warehousing & Business Intelligence	3	1	4	CT-xxx	Data Science Elective-IV	3	0	3
MG-482	Organisational Behaviour	3	0	3	MG-481	Entrepreneurship	3	0	3
CS-428	Parallel & Distributed Computing	3	1	4	CT-355	Information Security	3	0	3

Elective-III and Elective – IV			
CT-466	Artificial Neural Networks	3	0	3
CT-468	Deep Learning	3	0	3
CT-473	Cloud Computing	3	0	3
CT-474	Text Mining	3	0	3
CT-475	Privacy Preservation	3	0	3

Duration one academic year: Requires literature survey and preliminary work during this Semester

6.3 Cyber Security

FIRST YEAR

Fall Semester				Spring Semester			
Course Code	Course Title	Th	Pr	Total			

Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-175	Programming Fundamentals	3	1	4	CS-251	Logic Design & Switching Theory	3	1	4
CT-174	Fundamentals of Information Tech.	2	1	3	CT-162	Discrete Structures	3	0	3
MT-171	Differential & Integral Calculus	3	0	3	CT-260	Object Oriented Programming	3	1	4
PH-122	Applied Physics	3	1	4	HS-104	Functional English	3	0	3
HS-205	Islamic Studies OR	2	0	2	HS-105	Pakistan Studies OR	2	0	2
HS-209	Ethical Behaviour (for Non-Muslims)				HS-127	Pakistan Studies (for Foreigners)			
MT-001	Mathematics-1 (for Pre-Medical)	-	-	NC	HSK-I	Chinese Language OR	-	-	NC
					HS-231	Turkish Language-I			
					MT-002	Mathematics-2 (for Pre-Medical)	-	-	NC

SECOND YEAR

Fall Semester					Spring Semester				
Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-159	Data Structure Algorithms & Applications	3	1	4	CS-252	Computer Architecture & Organization	3	1	4
MT-227	Differential Equations	3	0	3	CT-261	Database Management Systems	3	1	4
HS-115	Academic Reading & Writing	3	0	3	HS-218	Business Communication	2	1	3
HS-219	Professional Ethics	2	0	2	CT-258	Financial & Cost Accounting	3	0	3
CT-259	System Analysis & Design	3	0	3	MT-272	Linear Algebra & Geometry	3	0	3
HSK-II	Chinese Language OR	-	-	NC	HS-200	Community Service	-	-	NC
HS-232	Turkish Language-II								

THIRD YEAR

Fall Semester					Spring Semester				
Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-363	Design & Analysis of Algorithms	3	0	3	CT-371	Vulnerability Assessment & Reverse Engineering	3	1	4
CT-365	Software Engineering	3	0	3					
CT-353	Operating Systems	3	1	4	CT-361	Artificial Intelligence & Expert Systems	3	1	4
CT-###	Cyber Security Elective-I	3	0	3	CT-486	Network & Information Security	3	1	4
CT-355	Information Security	3	0	3	CT-###	Cyber Security Elective-II	3	0	3
					CS-351	Computer Communication Networks	3	1	4

Elective-I and Elective – II			
CT-372	Wireless and Mobile Security	3	0	3
CT-373	Penetration Testing	3	0	3
CT-374	Cyber Security Laws and Regulations	3	0	3
CT-375	Cryptography and Cryptanalysis	3	0	3

FINAL YEAR

Fall Semester					Spring Semester				
Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
CT-499	*Software Based Project	0	3	3	CT-499	Software Based Project	0	3	3
CT-476	Information Assurance	3	0	3	CT-477	Secure Software Design & Development	3	1	4
CT-###	Cyber Security Elective-III	3	0	3	CT-###	Cyber Security Elective-IV	3	0	3
CS-428	Parallel & Distributed Computing	3	1	4	MG-481	Entrepreneurship	3	0	3
MG-482	Organisational Behaviour	3	0	3	CT-478	Digital Forensics	2	1	3

Elective-III and Elective – IV			
CT-479	Hardware Security	3	0	3
CT-480	Malware Analysis	3	0	3
CT-482	Embedded Systems Security	3	0	3
CT-483	Quantum Security	3	0	3

Duration one academic year: Requires literature survey and preliminary work during this Semester

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1921-2021

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