

Programs in Computing

Dean's Message

Welcome to the FAST school of Computing. We are the pioneers of Computing education in the country. In 1985, we started as a small and affiliated institute and today we have expanded to five cities of the country - offering five bachelor's degree programs, six master's degree programs, and two PhD degree programs within the Fast School of Computing. In addition, we also offer two specialization streams within the BS(CS) degree program.

With the emergence of innovative technologies such as Generative AI, Deep Learning, Data Science, Blockchain, Cyber Security, Gaming, Robotics, and IoT, our focus has been to make an innovative impact through their integration and application. Computing has a massive potential in our socio-economic development. Realizing this potential, our aim has been to empower the youth with capabilities, innovation, learning, and entrepreneurship.

The School of Computing takes honors in leading the computing education of the country. Our graduates have been playing an active and leading role, both at the national as well as the international level. In a recently concluded survey, P@SHA – the computing industrial representative of the country, placed us as the top ranked university among all the universities of the country, which offers computing



Dr. Jawwad Ahmed Shamsi

Professor & Dean (Computing)

[HEC approved PhD Supervisor](#)

PhD (CS), Wayne State University, USA (2009)

MS (CS), Eastern Michigan University, USA (2002)

BE (EE), NED-UET, Karachi (1998)

education.

Through our outstanding faculty, funded research, impactful publications, innovative ideas, well-equipped labs, and strong alliance with the industry, we strive to provide an environment which can nourish the young talent. We offer a variety of academic programs through which students can inspire to choose their desired specialization of studies. We aim to offer personalized growth to students so that they can enrich their talent and build upon their skills through curricular, co-curricular, and extra-curricular activities at the university.

I would like to invite you to explore the variety of opportunities offered by the University. I hope you will find the information useful. Please do not hesitate to contact us in case of any questions. My team and I will be glad to assist you.

Sincerely,

Bachelor of Science (Artificial Intelligence)

Program Mission

To provide theoretical knowledge and practical skills required for a professional career in artificial intelligence. The degree program follows artificial intelligence in breadth, covering core computing concepts with a specialization in artificial intelligence and its applications within the code of ethics.

Eligibility

- At least 60% marks in SSC (Matric) or an equivalent examination AND
- At least 50% marks in the HSSC or an equivalent examination AND
- Must have passed Mathematics at the HSSC level*.

Those who have taken the HSSC or an equivalent examination and are awaiting result can also apply.

* Pre-medical students who have passed additional maths or are awaiting result are eligible to take admission in all computing programs.

Career Opportunities

You may become risk manager, reporting analyst, project manager, enterprise analyst, data engineer, machine learning engineer, artificial intelligence developer etc.

Selection Criteria

Admission on the basis of NTS-NAT

- Selection is based on marks obtained in NTS NAT IE, or NAT-ICS.
- Cut-off marks to be determined by the University.

Admission on the basis of SAT

- A score of 1200 or more only for students who reside abroad.

Admission on the basis of NU Admission Test

Merit List is prepared by assigning the following weights.

- Matric marks 10%
- Intermediate marks 40%
- Score obtained in NU Admission Test/NTS 50%

Award of Degree

For the award of BS (Artificial Intelligence) degree, a student must have:

- Passed courses totalling at least 130 credit hours, including all core courses
- Earned CGPA of at least 2.00



Code	Title	Cr. Hrs	PreReq
Semester - I			
CL1000	Introduction to Information and Communication Technology	0+1	
CS1002	Programming Fundamentals	3+1	
NS1001	Applied Physics	3+0	
MT1003	Calculus & Analytical Geometry	3+0	
SS1012	Functional English	2+1	
SS1013	Ideology and Constitution of Pakistan	2+0	

Total 13+3

Semester - II			
CS1004	Object Oriented Programming	3+1	CS1002
EE1009	Digital Logic Design	2+1	
MT1008	Multivariable Calculus	3+0	MT1003
SS1007	Islamic Studies/Ethics	2+0	
SS1014	Expository Writing	2+1	

Total 12+3

Semester - III			
CS2001	Data Structures	3+1	CS1004
AI2001	Programming for Artificial Intelligence	3+1	
CS1005	Discrete Structures	3+0	
MT1004	Linear Algebra	3+0	
MT2005	Probability and Statistics	3+0	

Total 15+2

Semester - IV			
CS2005	Database Systems	3+1	CS2001
AI2002	Artificial Intelligence	3+1	
EE2014	Computer Organization and Assembly Language	2+1	EE1009
CS2004	Fundamentals of Software Engineering	3+0	
SS/MG?	SS/MG Elective - I	2+0	
SS3002	Civics and Community Engagement	2+0	

Total 15+3

Semester - V			
AI3002	Machine Learning	3+1	AI2001
AI3001	Knowledge Representation and Reasoning	3+0	AI2001
CS2006	Operating Systems	3+1	CS2001
CS2009	Design and Analysis of Algorithms	3+0	CS2001
SS2007	Technical and Business Writing	3+0	SS1014

Total 15+2

Semester - VI			
AI3003	Artificial Neural Networks	3+0	AI2001
CS3006	Parallel and Distributed Computing	3+0	CS2006
CS3001	Computer Networks	3+1	CS2001
Alxxxx	AI Elective - I	3+0	
Alxxxx	AI Elective - II	3+0	

Total 15+1

Semester - VII			
AI4091	Final Year Project - I	0+3	
AI4002	Computer Vision	3+1	AI3002
Alxxxx	AI Elective - III	3+0	CS1004
Alxxxx	AI Elective - IV	3+0	
SS/MG	SS/MG Elective - II	3+0	

Total 12+4

Semester - VIII			
AI4092	Final Year Project - II	0+3	AI4091
CS3002	Information Security	3+0	
MG4011	Entrepreneurship	3+0	
CS4001	Professional Practices in IT	3+0	
Alxxxx	AI Elective - V	3+0	

Total 12+3

Total 130			
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Note

Registration in “Final Year Project-I” is allowed provided the student has earned at least 100 credit hours, and his/her CGPA is equal to or greater than the graduating CGPA (2.0).

Domain	Cr. Hrs
Computing Core	49
General Education	30
Maths and Supporting Courses	12
Domain Core	21
Domain Elective	15
Elective Supportive Courses	3
Total	130

Program Mission

To provide the theoretical and practical knowledge and skills required for a professional career in computing. The degree program follows computer science in breadth covering core computer science and its applications within a code of ethics.

Eligibility

- At least 60% marks in SSC (Matric) or an equivalent examination AND
- At least 50% marks in the HSSC or an equivalent examination AND
- Must have passed Mathematics at the HSSC level*.

Those who have taken the HSSC or an equivalent examination and are awaiting result can also apply.

* Pre-medical students who have passed additional maths or are awaiting result are eligible to take admission in all computing programs.

Selection Criteria

Admission on the basis of NTS-NAT

- Selection is based on marks obtained in NTS NAT IE, or NAT-ICS.
- Cut-off marks to be determined by the University.

Admission on the basis of SAT

- A score of 1200 or more only for students who reside abroad.

Admission on the basis of NU Admission Test

Merit List is prepared by assigning the following weights.

- Matric marks 10%
- Intermediate marks 40%
- Score obtained in NU Admission Test/NTS 50%

Career Opportunities

The graduates holding BS (CS) degree will be able to adopt a wide range of careers, including Computer Programmer, Software Engineer, Software Developer, Web, Game and Mobile App Developer, Software Quality Engineer, and Graphics Designer etc.

Award of Degree

For the award of BS (Computer Science) degree, a student must have:

- Passed courses totalling at least 130 credit hours, including all core courses
- Earned CGPA of at least 2.00



Tentative Study Plan-Bachelor of Science (Computer Science)

Code	Title	Cr.Hrs	PreReq
Semester - I			
CL1000	Introduction to Information and Communication Technology	0+1	
CS1002	Programming Fundamentals	3+1	
NS1001	Applied Physics	3+0	
MT1003	Calculus and Analytical Geometry	3+0	
SS1012	Functional English	2+1	
SS1013	Ideology and Constitution of Pakistan	2+0	

Total 13+3

Semester - II			
CS1004	Object Oriented Programming	3+1	CS1002
EE1009	Digital Logic Design	2+1	
MT1008	Multivariable Calculus	3+0	MT1003
SS1007	Islamic Studies/Ethics	2+0	
SS1014	Expository Writing	2+1	

Total 12+3

Semester - III			
CS2001	Data Structures	3+1	CS1004
EE2014	Computer Organization and Assembly Language	2+1	EE1009
CS1005	Discrete Structures	3+0	
MT1004	Linear Algebra	3+0	
SS/MG	SS/MG Elective - I	2+0	
SS3002	Civics and Community Engagement	2+0	

Total 15+2

Semester - IV			
CS2005	Database Systems	3+1	CS2001
CS2006	Operating Systems	3+1	CS2001
CS2009	Design and Analysis of Algorithms	3+0	CS2001
MT2005	Probability and Statistics	3+0	
SS/MG	SS/MG Elective - II	3+0	

Total 15+2

Semester - V			
CS3005	Theory of Automata	3+0	
CS3001	Computer Networks	3+1	CS2001
CS3004	CS Elective 1 (Software Design and Analysis)	3+0	CS1004
SS2007	Technical and Business Writing	3+0	SS1014
CSxxxx	CS Elective - II	3+0	

Total 15+1

Semester - VI			
CS3009	Software Engineering	3+0	
EE2013	Computer Architecture	3+0	EE2014
CSxxxx	CS Elective - III	3+0	
AI2002	Artificial Intelligence	3+1	
CS3014	Applied Human Computer Interaction	2+1	

Total 14+2

Semester - VII			
CS4091	Final Year Project - I	0+3	
CS3002	Information Security	3+0	
CSxxxx	CS Elective - IV	3+0	
CS4001	Professional Practices	3+0	
CS4031	Compiler Construction	3+0	CS3005
CS3006	Parallel and Distributed Computing	3+0	CS2006

Total 15+3

Semester - VIII			
CS4092	Final Year Project - II	0+3	CS4091
MG4011	Entrepreneurship	3+0	
CSxxxx	CS Elective - V	3+0	
CSxxxx	CS Elective - VI	3+0	
CS4087	Advanced DBMS	2+1	CS2005

Total 11+4

Total 130	
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Note

Registration in "Final Year Project-I" is allowed provided the student has earned at least 100 credit hours, and his/her CGPA is equal to or greater than the graduating CGPA (2.0)

Domain	Cr. Hrs
Computing Core	49
General Education	30
Maths and Supporting Courses	12
Domain Core	18
Domain Elective	18
Elective Supportive Courses	3
Total	130

Program Mission

To provide theoretical knowledge and practical skills required for a professional career in computing and cyber security. The degree program follows cyber security in breadth, covering core computing with a specialization in cyber security and its applications within the code of ethics.

■ Career Opportunities

You may become cyber security specialist, cyber security analyst, cybercrime analyst, cyber security consultant, IT auditor, Information security manager/ administrator, Information assurance engineer, IT security consultant, digital forensics analyst, penetration and vulnerability tester etc.

Eligibility

- At least 60% marks in SSC (Matric) or an equivalent examination AND
- At least 50% marks in the HSSC or an equivalent examination AND
- Must have passed Mathematics at the HSSC level*.

Those who have taken the HSSC or an equivalent examination and are awaiting result can also apply.

* Pre-medical students who have passed additional maths or are awaiting result are eligible to take admission in all computing programs.

Selection Criteria

Admission on the basis of NTS-NAT

- Selection is based on marks obtained in NTS NAT IE, or NAT-ICS.
- Cut-off marks to be determined by the University.

Admission on the basis of SAT

- A score of 1200 or more only for students who reside abroad.

Admission on the basis of NU Admission Test

Merit List is prepared by assigning the following weights.

- Matric marks 10%
- Intermediate marks 40%
- Score obtained in NU Admission Test/NTS 50%



Award of Degree

For the award of BS (Cyber Security) degree, a student must have:

- Passed courses totalling at least 130 credit hours, including all core courses
- Earned CGPA of at least 2.00



Code	Title	Cr.Hrs	PreReq
Semester - I			
CL1000	Introduction to Information and Communication Technology	0+1	
SS1004	Functional English (ECC)	2+1	
NS1001	Natural Science (Applied Physics)	3+0	
CS1002	Programming Fundamentals	3+1	
MT1003	Calculus and Analytical Geometry	3+0	
SS1013	Ideology and Constitution of Pakistan	2+0	

Total 13+3

Semester - II			
CS1004	Object-Oriented Programming	3+1	CS1002
EE1009	Digital Logic Design	2+1	
SS1014	Expository Writing	2+1	SS1004
SS1007	Islamic Studies/Ethics	2+0	
MT1008	Multivariable Calculus	3+0	MT1003

Total 12+3

Semester - III			
CS1005	Discrete Structures	3+0	
CS2001	Data Structures	3+1	CS1004
EE2014	Computer Organization and Assembly Language	2+1	EE1009
CY2004	Cyber Security	2+1	
MT1004	Linear Algebra	3+0	
SS/MG?	SS/MG Elective - I	2+0	

Total 15+3

Semester - IV			
CS3001	Computer Networks	3+1	CS2001
CS2005	Database Systems	3+1	CS2001
SS3002	Civics and Community Engagement	2+0	
MT2005	Probability and Statistics	3+0	
CS2009	Design and Analysis of Algorithms	3+0	CS2001

Total 14+2

Semester - V			
CS2006	Operating Systems	3+1	CS2001
SS2007	Technical and Business Writing	3+0	SS1014
CY3005	Network Security	3+1	CS3001
CS2004	Software Engineering	3+1	
CYxxxx	CY Elective - I	3+0	

Total 15+3

Semester - VI			
CY2002	Digital Forensics	3+1	CY2001
AI2002	Artificial Intelligence	3+0	
CS3002	Information Security	3+0	
CYxxxx	CY Elective - II	3+0	
CY4001	Secure Software Design and Development	3+1	CS2004

Total 15+2

Semester - VII			
CY4091	Final Year Project I	0+3	
CYxxxx	CY Elective - III	3+0	
CY3003	Information Assurance	3+0	
CYxxxx	CY Elective - IV	3+0	
CS4001	Professional Practices in IT	3+0	

Total 12+3

Semester - VIII			
CY4092	Final Year Project II	0+3	CY4091
MG4011	Entrepreneurship	3+0	
CYxxxx	CY Elective - V	3+0	
SSxxxx	SS/ MG Elective -II	3+0	
CS3006	Parallel and Distributed Computing	3+0	CS2006

Total 12+3

		Total 130	
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Note

Registration in "Final Year Project-I" is allowed provided the students has earned at least 100 credit hours, and his/her CGPA is equal to or greater than the graduating CGPA (2.0).

Domain	Cr. Hrs
Computing Core	49
General Education	30
Maths and Supporting Courses	12
Domain Core	21
Domain Elective	15
Elective Supportive Courses	3
Total	130

Bachelor of Science (Data Science)

Program Mission

To provide theoretical knowledge and practical skills required for a professional career in computing and data science. The degree program follows data science in breadth, covering core computing with a specialization in data science and its applications within the code of ethics.

Career Opportunities

You may become data scientist, business analyst, big data analyst, social networks analyst, data engineers, decision scientist, data quality assurance experts, business analyst, business intelligence analyst, data consultant, data associate, database developer, software engineer, machine learning engineer etc.

Eligibility

- At least 60% marks in SSC (Matric) or an equivalent examination AND
- At least 50% marks in the HSSC or an equivalent examination AND
- Must have passed Mathematics at the HSSC level*.

Those who have taken the HSSC or an equivalent examination and are awaiting result can also apply.

* Pre-medical students who have passed additional maths or are awaiting result are eligible to take admission in all computing programs.



Selection Criteria

Admission on the basis of NTS-NAT

- Selection is based on marks obtained in NTS NAT IE, or NAT-ICS.
- Cut-off marks to be determined by the University.

Admission on the basis of SAT

- A score of 1200 or more only for students who reside abroad.

Admission on the basis of NU Admission Test

Merit List is prepared by assigning the following weights.

- Matric marks 10%
- Intermediate marks 40%
- Score obtained in NU Admission Test/NTS 50%



Award of Degree

For the award of BS (Data Science) degree, a student must have:

- Passed courses totalling at least 130 credit hours, including all core courses
- Earned CGPA of at least 2.00



Code	Title	Cr.Hrs	PreReq
Semester - I			
CL1000	Introduction to Information and Communication Technology	0+1	
CS1002	Programming Fundamentals	3+1	
NS1001	Applied Physics	3+0	
MT1003	Calculus and Analytical Geometry	3+0	
SS1012	Functional English	2+1	
SS1013	Ideology and Constitution of Pakistan	2+0	

Total 13+3

Semester - II			
CS1004	Object Oriented programming	3+1	CS1002
EE1009	Digital Logic Design	2+1	
MT1008	Multivariable Calculus	3+0	MT1003
SS1007	Islamic Studies/Ethics	2+0	
SS1014	Expository Writing	2+1	

Total 12+3

Semester - III			
CS2001	Data Structures	3+1	CS1004
DS2001	Introduction to Data Science	3+1	
CS1005	Discrete Structures	3+0	
MT1004	Linear Algebra	3+0	
MT2005	Probability and Statistics	3+0	

Total 15+2

Semester - IV			
CS2005	Database Systems	3+1	CS2001
DS2003	Advanced Statistics	3+0	
EE2014	Computer Organization and Assembly Language	2+1	EE1009
CS2004	Fundamentals of Software Engineering	3+0	
SS/MG?	SS/MG Elective - I	2+0	
SS3002	Civics and Community Engagement	2+0	

Total 15+2

Semester - V			
DS3003	Data Warehousing and Business Intelligence	3+1	CS2005
DS3001	Data Analysis and Visualization	3+1	DS2001
CS2006	Operating Systems	3+1	CS2001
CS2009	Design and Analysis of Algorithms	3+0	CS2001
SS2007	Technical and Business Writing	3+0	SS1014

Total 15+3

Semester - VI			
AI2002	Artificial Intelligence	3+1	
CS3006	Parallel and Distributed Computing	3+0	CS2006
DS3002	Data Mining	3+0	CS2001
DSxxxx	DS Elective - I	3+0	
DSxxxx	DS Elective - II	3+0	

Total 15+1

Semester - VII			
DS4091	Final Year Project - I	0+3	
CS3001	Computer Networks	3+1	CS2001
CS3004	DS Elective - III	3+0	CS1004
DSxxxx	DS Elective - IV	3+0	
SS/MG	SS/MG Elective - II	3+0	

Total 12+4

Semester - VIII			
DS4092	Final Year Project - II	0+3	DS4091
CS3002	Information Security	3+0	
MG4011	Entrepreneurship	3+0	
CS4001	Professional Practices in IT	3+0	
DSxxxx	DS Elective - V	3+0	

Total 12+3

		Total 130	
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Note

Registration in “Final Year Project-I” is allowed provided the student has earned at least 100 credit hours, and his/her CGPA is equal to or greater than the graduating CGPA (2.0).

Domain	Cr. Hrs
Computing Core	49
General Education	30
Maths and Supporting Courses	12
Domain Core	21
Domain Elective	15
Elective Supportive Courses	3
Total	130

Bachelor of Science (Software Engineering)

Program Mission

The mission of Bachelor of Software Engineering program is to produce competent, technically sound and socially responsible software engineering professionals and researchers capable of addressing contemporary and future software engineering challenges and developing innovative solutions through impactful research.

Eligibility

- At least 60% marks in SSC (Matric) or an equivalent examination AND
- At least 50% marks in the HSSC or an equivalent examination.
- Must have passed Mathematics at the HSSC level*.

Those who have taken the HSSC or an equivalent examination and are awaiting result can also apply.

* Pre-medical students who have passed additional maths or are awaiting result are eligible to take admission in all computing programs.

Selection Criteria

Admission on the basis of NTS-NAT

- Selection is based on marks obtained in NTS NAT IE, or NAT-ICS.
- Cut-off marks to be determined by the University.

Admission on the basis of SAT

- A score of 1200 or more only for students who reside abroad.

Admission on the basis of NU Admission Test

Merit List is prepared by assigning the following weights.

- Matric marks 10%
- Intermediate marks 40%
- Score obtained in NU Admission Test/NTS 50%

Career Opportunities

The graduates of SE degree may become Software Quality Assurance Engineer, Systems Programmer, Embedded Software Engineer, Software architect, Chief Technology Officer, Chief Information Officer, User Interface Designer, Information Systems Manager or Computer Graphic Designer etc.

Award of Degree

For the award of BS (Software Engineering) degree, a student must have:

- Passed courses totalling at least 130 credit hours, including all core courses
- Earned CGPA of at least 2.00



Tentative Study Plan-Bachelor of Science (Software Engineering)

Code	Title	Cr.Hrs	PreReq
Semester – I			
CL1000	Introduction to Information and Communication Technology	0+1	
CS1002	Programming Fundamentals	3+1	
NS1001	Applied Physics	3+0	
MT1003	Calculus & Analytical Geometry	3+0	
SS1013	Ideology and Constitution of Pakistan	2+0	
SS1012	Functional English	2+1	

Total 13+3

Semester – II			
CS1004	Object Oriented Programming	3+1	CS1002
SE1001	Introduction to Software Engineering	3+0	
CS1005	Discrete Structures	3+0	
EE1009	Digital Logic Design	2+1	
MT1008	Multivariable Calculus	3+0	MT1003

Total 14+2

Semester – III			
CS2001	Data Structures	3+1	CS1004
SE2001	Software Requirements Engineering	3+0	SE1001
EE2014	Computer Organization and Assembly Language	2+1	EE1009
MT1004	Linear Algebra	3+0	
SS1007	Islamic Studies/Ethics	2+0	
SS/MG?	SS/MG Elective – I	2+0	

Total 15+2

Semester – IV			
CS2005	Database Systems	3+1	CS2001
CS2009	Design and Analysis of Algorithms	3+0	CS2001
SE2002	Software Design and Architecture	3+0	CS1004
CS2006	Operating Systems	3+1	CS2001
SS1014	Expository Writing	2+1	

Total 14+3

Semester – V			
SE3004	Software Construction and Development	2+1	SE2002
SE3002	Software Quality Engineering	3+0	SE1001
MT2005	Probability and Statistics	3+0	
SS2007	Technical and Business Writing	3+0	SS1014
SExxxx	SE Elective – I	3+0	

Total 14+1

Semester – VI			
CS3001	Computer Networks	3+1	CS2001
SE4002	Fundamentals of Software Project Management	3+0	SE2001
AI2002	Artificial Intelligence	3+1	
SExxxx	SE Elective – II	3+0	
SExxxx	SE Elective – III	3+0	

Total 15+2

Semester – VII			
SE4091	Final Year Project-I	0+3	
CS3002	Information Security	3+0	
CS3006	Parallel and Distributed Computing	3+0	CS2006
SS3002	Civics and Community Engagement	2+0	
SExxxx	SE Elective – IV	3+0	
SExxxx	SE Elective – V	3+0	

Total 14+3

Semester – VIII			
SE4092	Final Year Project-II	0+3	SE4091
CS4001	Professional Practices in IT	3+0	
SS/MG	SS/MG Elective – II	3+0	
SExxxx	SE Elective – VI	3+0	
MG4011	Entrepreneurship	3+0	

Total 12+3

Total 130	
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Note

Registration in “Final Year Project-I” is allowed provided the student has earned at least 100 credit hours, and his/her CGPA is equal to or greater than the graduating CGPA (2.0).

Domain	Cr. Hrs
Computing Core	49
General Education	30
Maths and Supporting Courses	12
Domain Core	18
Domain Elective	18
Elective Supportive Courses	3
Total	130

Program Mission

To produce competent and well-rounded professionals capable of applying Artificial intelligence & Data Science to solve real-life problems.

Program Objectives

The MS (Artificial Intelligence) comprises of both course work as well as research component. There are three core courses aimed at strengthening the understanding and competence of students in artificial intelligence fundamentals. The University expects its MS (Artificial Intelligence) graduates to pursue careers as AI experts in either academia or industry.

Program Learning Outcomes

1. Create autonomous systems/ agents for solving complex real-world problems.
2. Apply the tools and techniques to make a strategically important impact on industry and society.
3. Pursue doctoral studies within the domain of Artificial Intelligence at top-ranked institutes of the world.
4. Take a leadership role in both AI academia and industry.
5. Students shall have the ability to make effective oral and written presentations on technical topics.

Eligibility

- Degree in relevant subject of Science or Engineering, earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0).

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%

A student selected for admission may be asked to study upto four deficiency courses. These must be passed in the first two semesters. Deficiency courses shall be determined by the Graduate Studies Committee, before admitting the student. Fee is not charged for studying deficiency courses. A student may be allowed to take the Mathematical Foundations of AI course along with the deficiency courses.



Tentative Study Plan of MS (Artificial Intelligence)

Semester -I		
AI 5001 Advanced Artificial Intelligence	3+0	
AI 5002 Mathematical Foundations of AI	3+0	
CS 4002 Applied Programming ¹	NC	
General Elective (Computing/MG)	3+0	
		Total 9+0

Semester -II		
AI 5003 Advanced Machine Learning	3+0	
CS 5001 Research Methodology	3+0	
Computing Elective-I	3+0	
		Total 9+0

Semester -III		
Computing Elective-II	3+0	
AI MS Thesis-I/MS Project-I	0+3	
		Total 3+3

Semester -IV		
Computing Elective-III	3+0	
AI MS Thesis-II/MS Project-II	0+3	
		Total 3+3

Note

Applied Programming course is of No Credit (NC). Applied Programming course may be exempted based on good performance in the admission test. However, the students must have studied 'Object Oriented Programming' and 'Data Structures' at undergraduate level.

Registration in "MS Thesis/ Project – I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course; AND
- c) CGPA is equal to or more than 2.5

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more

Program Mission

Mission of the MS (Computer Networks and Security) program is to produce future thinkers, leaders, and innovators to shape the future of the nation and humanity through high-quality education, research, and technopreneurship.

Program Objectives

This program prepares students to meet challenges posed by a highly inter-connected world. Mobile computing, Sensor networks and other emerging technologies require a thorough understanding of related technologies. This program provides understanding and exposure to the latest trends and technologies in this field.

Program Learning Outcomes

1. To equip students so that they able to play an effective role in international efforts to make the cyberspace safe, secure and reliable for the national and international community.
2. Prepare student to learn the technical aspects of information security by understanding current threats and vulnerabilities and examining ways of developing effective countermeasures.
3. To produce skilled people who are able to contribute towards need of protecting national information infrastructure from all kinds of threats.
4. Prepare students who can understand the implications of handling data in terms of data security.
5. Students shall have the ability to make effective oral and written presentations on technical topics.

Eligibility

- Degree in relevant subject of Science or Engineering, earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0).

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more



Tentative Study Plan of MS (Computer Networks and Security)

Semester -I	
CS 4002 Applied Programming ¹	NC
Core Course-I	3+0
Core Course-II	3+0
General Elective (Computing/MG)	3+0
Total	9+0

Semester -II	
CS 5001 Research Methodology	3+0
Core Course-III	3+0
Computing Elective-I	3+0
Total	9+0

Semester -III	
Computing Elective-II	3+0
MS Thesis-I/MS Project-I	0+3
Total	3+3

Semester -IV	
Computing Elective-III	3+0
MS Thesis-II/MS Project-II	0+3
Total	3+3

Note

Applied Programming course is of No Credit (NC). Applied Programming course may be exempted based on good performance in the admission test. However, the students must have studied 'Object Oriented Programming' and 'Data Structures' at undergraduate level.

Registration in "Thesis-I/Project – I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course; AND
- c) CGPA is equal to or more than 2.5

Core Courses

(Pass any THREE of the following)

- CY 5001 Network & Cyber Security
- CS 5009 Advanced Operating Systems
- CS 5010 Applied Information Security
- CS 5011 Performance of Comp. Networks
- CS 5012 Advanced Computer Networks
- CS 5013 Routing & Switching
- CS 5014 Network Management

Master of Science (Computer Science)

Program Mission

MS (Computer Sciences) course work is tailored according to the international standards to nurture the capacity building and original thinking in our postgraduates for lifelong-learning. Our goal is to produce such postgraduates that they are highly sought after by a large number of national and international IT organizations and can pursue their further studies in national and international universities.

Program Objectives

1. To produce computer scientists who fulfil the requirements of the industry's software needs.
2. To fill the vacuum present, due to lack of computer science and technology education in the local region and beyond.
3. To provide a broad understanding of the computer sciences field by introducing innovative concepts, theories, and techniques.
4. To sharpen communication skills in students and enable them to produce well-organized reports.
5. To provide formal foundations for further higher education.
6. To develop highly skilled researchers who are scholars who may pursue in the field of computer sciences

Program Learning Outcomes

1. Students will possess advanced knowledge of the Computer Science field.
2. Students will be able to think creatively and critically; to solve non-trivial problems.
3. Students will be able to use computing knowledge to develop efficient solutions for real-life problems.
4. Students will be able to design solutions and can conduct research-related activities.

5. Students shall have the ability to make effective oral and written presentations on technical topics.

Eligibility

- Degree in relevant subject of Science or Engineering, earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0).

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%

The following core courses are recommended to be completed before entering the MS (CS) program.

1. Computer Programming
2. Data Structures
3. Operating Systems
4. Database Systems
5. Design and Analysis of Algorithms
6. Computer Networks
7. Theory of Automata
8. Software Engineering

A student selected for admission having deficiency in the above stated courses may be required to study a maximum of FOUR courses, which must be passed in the first two semesters. Deficiency courses shall be determined by the Graduate Studies Committee, before admitting the student. Fee is not charged for studying deficiency courses. A student may be allowed to take Research Methods and Applied Programming course along with deficiency courses. If a student only has a deficiency in Theory of Automata, then the student cannot take Theory of Programming Languages and Advanced Theory of Computation. Other courses in MS may be allowed to take. If a student has deficiency in Programming Fundamentals, Object Oriented Programming, and Algorithms, then it may be covered through the Applied Programming course

Tentative Study Plan of MS (Computer Science)

Semester -I			
CS	4002	Applied Programming ¹	NC
		Core Course-I	3+0
		Core Course-II	3+0
		Core Course-III	3+0
Total			9+0
Semester -II			
CS	5001	Research Methodology	3+0
		Computing Elective-I	3+0
		Computing Elective-II	3+0
Total			9+0
Semester -III			
		Computing Elective-III	3+0
		MS Thesis-I/MS Project-I	0+3
Total			3+3
Semester -IV			
		Computing Elective-IV	3+0
		MS Thesis-II/MS Project-II	0+3
Total			3+3

Note

Applied Programming course is of No Credit (NC). Applied Programming course may be exempted based on good performance in the admission test. However, the students must have studied 'Object Oriented Programming' and 'Data Structures' at undergraduate level.

Registration in "MS Thesis – I/MS Project - I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course; AND
- c) CGPA is equal to or more than 2.5

Core Courses for MS (CS)

At least three courses must be taken from the following

CS5001 Advanced Analysis of Algorithms
CS5005 Advanced Operating Systems
CS5007 Advanced Theory of Computation
CS5006 Theory of Programming Languages

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more

Program Mission

MS (Data Science) course work is tailored according to the international standards to nurture the capacity building and original thinking in our postgraduates for lifelong-learning. Our goal is to produce such postgraduates that are highly sought after by national and international organizations and can pursue their further studies in national and international universities.

Program Objectives

This program equips students to transform data into actionable insights that enable one to make complex business decisions. Students will be able to process large and complex data sets through computational, statistical, and machine learning techniques. This program will provide exposure to the latest trends and technologies in this field thus producing the man-power to fuel national and international emerging market of data science products.

The objectives of the MS (Data Science) program are:

1. To produce computer scientists who fulfil the requirements of the national and international market of data science products.
2. To equip students to transform data into actionable insights that enable them to make complex business decisions.
3. To enable students to apply computational, statistical, and machine learning techniques to process large and complex data sets.
4. To enable students to conceive and execute data science projects.

Learning Outcomes

The outcomes of the MS (Data Science) program are:

1. To equip students to transform data into actionable insights to

make complex business decisions.

2. To enable students, understand and analyze a problem and arrive at computable solutions.
3. To expose students to the set of technologies that match those solutions.
4. To gain hands-on experience on data-centric tools for statistical analysis, visualization, and big data applications at the same rigorous scale as in a practical data science project.
5. To understand the implications of handling data in terms of data security and business ethics.
6. Students shall have the ability to make effective oral and written presentations on technical topics.

Eligibility

- Degree in relevant subject of Science or Engineering or Mathematics, earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0).

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%

The following three courses or equivalent are prerequisites for starting MS (Data Science) coursework.

1. Object Oriented Programming
2. Data Structures and Algorithms
3. Database Systems

A student selected for admission having deficiency in the above stated courses may be required to study them. However, these must be passed in the first two semesters. Deficiency courses shall be determined by the Graduate Studies Committee, before admitting the student. Fee is not charged for studying deficiency courses.

A student may take the Stat & Mathematical Data Science course along with the deficiency courses.

Tentative Study Plan of MS (Data Science)

Semester -I		
CS 4002 Applied Programming ¹	NC	
DS 5002 Data Science Tools & Techniques	3+0	
DS 5003 Stat. & Math Methods for DS	3+0	
DS Specialized Core-I	3+0	
		Total 9+0
Semester -II		
CS 5001 Research Methodology	3+0	
DS 5004 Machine Learning for Data Science	3+0	
DS Specialized Core-II	3+0	
		Total 9+0
Semester -III		
Computing Elective-I	3+0	
DS MS Thesis-I/MS Project-I	0+3	
		Total 3+3
Semester -IV		
Computing Elective-II	3+0	
DS MS Thesis-II/MS Project-II	0+3	
		Total 3+3

Note

Applied Programming course is of No Credit (NC). Applied Programming course may be exempted based on good performance in the admission test. However, the students must have studied 'Object Oriented Programming' and 'Data Structures' at undergraduate level.

Registration in "MS Thesis – I / MS Project - I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course; AND
- c) CGPA is equal to or more than 2.5

Specialized Core Courses (Choose 2)

1. DS 5001 Advance Big Data Analytics (3)
2. DS 5005 Distributed Data Processing (3)
3. DS 5006 Deep Learning (3)
4. DS 5007 Natural Language Processing (3)

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more

Program Mission

Our mission is to produce future software designers and innovators to shape the future of the nation through high-quality education, research, and technopreneurship. To provide students with state-of-the-art knowledge of the field and to develop their practical skills to meet current industrial requirements, as well as enhancing their ability to adapt to the new developments of tomorrow's technology.

Program Objectives

1. Prepare students who can critically apply concepts, theories, and practices to provide creative solutions to complex computing problems.
2. Prepare students to effectively communicate their ideas in written and electronic form and prepare them to work collaboratively in a team environment.
3. Prepare students with theoretical background of software engineering concepts, and train them on applied research of the field, needed to secure a doctorate position in the future.
4. Prepare students to join a dynamic and diverse career position in a computing-related field, and to maintain a growing career in a rapidly evolving field.
5. Prepare students who can define, plan, implement, and test a medium-sized software project using appropriate software engineering processes, methods, and techniques.
6. Theories and practices to provide creative solutions to complex computing problems.
7. To respond to the current and emerging industrial needs utilizing modern trends for building complex software systems.

Program Learning Outcomes

1. To have the ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.
3. To use the techniques, skills, and modern software engineering tools necessary for developing resilient software.
4. To demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. To Communicate effectively with different audiences
6. To change the world for the better through research and development- in areas like healthcare, transportation, education, etc.

Eligibility

- Degree in relevant subject of Science or Engineering, earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0).

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%

The following core courses are recommended to be completed before entering the MS (SE) program.

1. Object Oriented Programming
2. Data Structures
3. Software Engineering
4. Software Design and Analysis
5. Software Quality Engineering

A student selected for admission having deficiency in the above stated courses may be required to study a maximum of FOUR courses. These courses must be passed in the first two semesters. Deficiency courses shall be determined by the Graduate Studies Committee, before admitting the student. No fee is charged for studying deficiency courses.

Tentative Study Plan of MS (Software Engineering)

Semester -I	
CS 4002 Applied Programming ¹	NC
SE 5001 Adv. Software Req. Engineering	3+0
SE 5002 Adv. Quality Assurance	3+0
Computing Elective-I	3+0
Total 9+0	
Semester -II	
CS 5001 Research Methodology	3+0
SE 5003 Adv. Software Architecture	3+0
Computing Elective-II	3+0
Total 9+0	
Semester -III	
Computing Elective-III	3+0
MS Thesis-I/MS Project-I	0+3
Total 3+3	
Semester -IV	
Computing Elective-IV	3+0
MS Thesis-II/MS Project-II	0+3
Total 3+3	

Note

Applied Programming course is of No Credit (NC). Applied Programming course may be exempted based on good performance in the admission test. However, the students must have studied 'Object Oriented Programming' and 'Data Structures' at undergraduate level.

Registration in "MS Thesis – I / MS Project - I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course; AND
- c) CGPA is equal to or more than 2.5

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more

Program Mission

To develop student's skills necessary to manage software projects, coupling both with its theoretical and practical aspects that, strengthens them to acquire leadership positions in the software industry whereby they can become agents of change and improvement.

Program Objectives

1. To prepare the students to assess and manage risks by developing strategies to handle them.
2. To enable students to gather and manage requirements, and provide effective coordination between relevant stakeholders.
3. To help students in identifying, documenting and analyzing change management to agreeing on changes to scope.
4. To prepare students for configuration management of large scale software.
5. To enable students in identifying, prioritizing and agreeing on software releases by preparing release schedules by estimating software costs and resource requirements.
6. To acquire students with the ability to identify and resolve conflicts that may arise during the management of software projects.
7. Inculcate a sense of ethics, responsibilities and leadership.

Program Learning Outcomes

1. Students will be able to exhibit expertise in managing large-scale projects as their final year project or conduct research related to Software Project management.

2. Students will demonstrate analytical and communication skills while exhibiting project resource forecasting abilities and quality implementation for successful completion of the project.
3. Students will develop skills to understand and implement industry adopted standards and calculate and examine project and process metrics.
4. Demonstrate effective organizational leadership skills concerning project teams and stakeholders.

Eligibility

- A degree in Science / Engineering earned from a recognized university after 16 years of education with at least 60% marks or CGPA of at least 2.0 (on a scale of 4.0) AND
- Two years of post-qualification experience in software development or related area

Selection Criteria

- Past Academic Record (Bachelor) 50%
- Score obtained in NU Admission Test/NTS-GAT (General) 50%



Tentative Study Plan of MS (Software Project Management)

Semester -I		
CS 5001	Research Methodology	3+0
CS 5015	Software Project Management	3+0
MG 4006	Management & Org. Behaviour	3+0
		Total 9+0

Semester -II		
CS 5002	Software Quality Assurance	3+0
CS 5003	Software Process Manage. & Metrics	3+0
CS 5004	Requirements Engineering	3+0
		Total 9+0

Semester -III		
Computing Elective		3+0
MS Thesis-I/MS Project-I/Practicum-1		0+3
		Total 3+3

Semester -IV		
General Elective-I(Computing/MG)		3+0
MS Thesis-II/MS Project-II/Practicum-II		0+3
		Total 3+3

Registration in "Thesis-I/Project-I/Practicum-I" is allowed provided the student has

- a) Earned at least 15 credits
- b) Passed the "Research Methodology" course AND
- c) CGPA is equal to or more than 2.5

Award of Degree

For the award of MS degree, a student must have:

- Passed courses totalling at least 30 credit hours, including core courses.
- Earned CGPA of 2.50 or more