Graphic Era Deemed to be University DEHRADUN

NAAC GRADE A+ ACCREDITED

CURRICULUM
for
POSTGRADUATE DEGREE PROGRAM

MASTER OF TECHNOLOGY
IN
Computer Science and Engineering
Scheme of Teaching and Evaluation 2025
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2025-26)
In accordance with NEP 2020

Computer Science and Engineering
GRAPHIC ERA (DEEMED TO BE UNIVERSITY)
566/6, Bell Road, Clement Town,
Dehradun, Uttarakhand 248002 INDIA
https://www.geu.ac.in

CONTENTS

1. Preamble

The role of higher education is pivotal in securing gainful employment and/or providing access to further studies comparable to those offered by world-class institutions. Therefore, improving the quality of higher education must be accorded the highest priority to equip the younger generation with the skills, training, and knowledge necessary to enhance critical thinking, comprehension, and application abilities, thereby preparing them to compete, succeed, and excel globally. Sustained reforms are essential to strengthen the current higher education system by upgrading academic resources and learning environments, raising the quality of teaching, and improving standards of achievement in undergraduate learning outcomes. In alignment with this vision, the Graphic Era (Deemed to be University) has revised its undergraduate programmes in Computer Science and Engineering to meet the model curriculum proposed by the All India Council for Technical Education (AICTE) and the guidelines of the National Education Policy (NEP) 2020. The updated curriculum incorporates Outcome-Based Education (OBE) and the Choice-Based Credit System (CBCS), making it student-centric, interactive, and well-defined in its aims, objectives, and goals. In keeping with NEP 2020's emphasis on multidisciplinary learning, the curriculum is designed to be flexible, enabling students to pursue creative and diverse subject combinations.

2. About the Program

The Department of Computer Science & Engineering was established in the year 2001. Since then, the department has held a position of pride in the Graphic Era (Deemed to be University). It has consistently fulfilled its role of producing Computer Engineers ready to meet the demands of the IT world. The department has always attracted the best engineering aspirants from all over the country. It has a well-qualified and experienced team of faculty. The Department offers B.Tech., M.Tech., and Ph.D. courses in Computer Science and Engineering. The department has adequate facilities to support these teaching activities. Students of the department have access to sufficient high-end computing facilities. The Department is also actively involved in various research activities. The facilities are adequate to cater to the needs of Research activities. The department has signed an MoU with reputed Companies and Universities for academic collaborative projects.

3. Vision & Mission

3.1 Vision and Mission of the University

Vision

We visualize Graphic Era (Deemed to be University) as an internationally recognized, enquiry-driven, ethically engaged diverse community, whose members work collaboratively for positive transformation in the world, through leadership in teaching, research, and social action

Mission

The mission of the university is to promote learning in true spirit and offering knowledge and skills in order to succeed as professionals. The university aims to distinguish itself as a diverse, socially responsible learning community with a high quality scholarship and academic rigor.

3.2 Vision and Mission of the Department

Vision

To impart quality education for producing highly talented globally recognizable technocrats and entrepreneurs with sound ethics, latest knowledge and innovative ideas in Computer Science and Engineering to meet industrial needs and societal expectations.

Mission

M1. To impart high standard value based technical education in all aspects of Computer Science and Engineering through state of the art infrastructure and innovative approach.

M2. To produce ethical, motivated and skilled engineers through theoretical knowledge and practical applications.

M3. To impart the ability for tackling simple to complex problems individually as well as in a team.

M4. To develop globally competent engineers with strong foundations, capable of “out of the box” thinking so as to adapt to the rapidly changing scenarios requiring social conscious green computing solutions.

4. Program Educational Objectives

PEO1: To produce students employable towards building a successful career based on sound understanding of theoretical and applied aspects as well as methodology to solve multidisciplinary real-life problems.

PEO2: To produce professional graduates ready to work with a sense of responsibility, ethics and enabling them to work efficiently individually and also as a team.

PEO3: To impart the competency in students so that they are able to pursue higher studies and research in areas of engineering and other professionally related fields.

PEO4: To inculcate ability to adapt to the changing technology through continuous learning.

5. Consistency of PEOs with Mission of the Department

PEO Statements	M1	M2	M3	M4
PEO1	3	1	2	2
PEO2	-	2	3	2
PEO3	2	3	2	3
PEO4	2	2	-	3

High correlation (3); Medium correlation (2); Low correlation (1), No correlation (-)

6. Program Outcomes (POs)

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3. Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4. Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5. Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6. The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.

PO7. Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.

PO8. Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9. Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10. Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11. Life-long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

7. Program Specific Outcomes (PSOs)

In addition to these twelve POs, three Program Specific Outcomes (PSOs) are formulated

PSO1: Ability to analyze, design, implement, and test software systems based on requirement specifications and development methodologies of software systems.

PSO2: Apply computer science theory blended with engineering mathematics to solve computational tasks and model real world problems using appropriate programming language, data structure, and algorithms.

PSO3: Ability to explore technological advancements in various domains, evaluate its merits and identify research gaps to provide solution to new ideas and innovations.

8. Program Structure

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Nomenclature as per AICTE

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
C	Credits
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
LC	Laboratory courses
MC	Mandatory courses

C. Nomenclature as per NEP 2020

Code	Definitions
DSC	Discipline Specific Core
DSE	Discipline Specific Elective
UOE	University Open Elective/Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Course
PROJ	Project/Seminar/Internship/Summer training
VAC	Value Addition Course
MNG	Mandatory Non-Graded Course

Definitions

Courses of study – Courses of study indicates pursuance of study in a particular discipline. Every discipline shall offer various categories of courses of study, viz. Discipline Specific Core courses (DSC), Discipline Specific Electives (DSE), University Open Elective/Generic Elective (UOE), Ability Enhancement Course (AEC), Skill Enhancement Course (SEC), Value Addition Course (VAC), Internship/Apprenticeship/Project/Community Outreach (PROJ) and Mandatory Non-Graded Course (MNG)

a) Discipline Specific Core (DSC): Discipline Specific Core is a course of study, which should be pursued by a student as a major component, of the discipline as mandatory requirement of his/her programme of study. DSC shall be the core credit courses of that particular discipline which will be appropriately graded and arranged across the semesters of study.

b) Discipline Specific Elective (DSE): The Discipline Specific Electives (DSE) shall be a pool of credit courses of that particular discipline (single discipline programme of study) or those disciplines (multidisciplinary programme of study), as the case may be, which a student chooses to study from his/her particular discipline(s). There shall be a pool of DSE from which a student may choose a course of study.

c) University Open Elective/Generic Elective (UOE): An elective course chosen generally from other discipline(s) with an intention to seek exposure is called a University Open Elective/Generic Elective. UOE shall consist of a pool of courses offered by various disciplines of study in groups of odd and even semesters, from which a student can choose.

d) Ability Enhancement Course (AEC): Ability Enhancement courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills, that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity.

e) Skill Enhancement Course (SEC): SE courses are skill-based courses in all disciplines and are aimed at providing hands-on-training, skills etc, to enhance student skills.

f) Value Addition Course (VAC): VA courses are value-based courses which are meant to inculcate ethics, culture, Indian Knowledge systems, constitutional values, soft skills, sports education and such similar values to students which will help in all round development of students.

g) Major Project/Seminar/Internship/Summer training (PROJ)

i. Internship /Apprenticeship: All students will also undergo internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions.

ii. Major Project: Students are required to take up major project under the guidance of a faculty member. The student shall be encouraged to get engaged in Research Based Project in final year (VII and VIII semesters). The research outcomes of their project work may be published in peer-reviewed journals or may be presented in conferences /seminars or may be patented.

h) Mandatory Non-Graded Course (MNG)

These courses are offered to nurture holistic qualities in a student, making him/her a responsible citizen conscious of societal & global challenges and responsibilities thereof. These include Indian Knowledge System (IKS), Healthy Living and Fitness, Environmental Sciences, Indian Constitution and so on. Generally, shall be offered through hybrid mode with mentors and shall be evaluated through End Semester examination.

9. Major Features of Curriculum

- Flexible Choice Based System for students to pursue courses of their interest.
- Includes a Range of Courses to cover the diversity of Computer Science and Engineering Specializations.
- The curriculum is designed with a proper blend of research and industry-relevant subjects taught through collaborative learning.
- Core courses provide a strong foundation in programming, algorithms, data structures, computer architecture, etc. These essential courses equip students with the skills needed for problem-solving and software development.
- Elective courses allow students to tailor their education to their interests and career goals. These courses cover advanced topics such as artificial intelligence, cybersecurity, Data Science, cloud computing, etc., providing in-depth knowledge and specialized skills in emerging areas of computer science.
- Practical experience in the curriculum is gained through laboratory courses that offer hands-on engagement with hardware and software, reinforcing theoretical knowledge.

Internship programs provide real-world industry exposure, while capstone projects integrate learning by solving real-world problems

- To impart high competency to the students, the curriculum offers distinct ability enhancement and value-added courses.
- Apart from the technical course, the program offers a range of courses that provide the students with a broad range of knowledge and skill sets, like life skills and mentoring, soft skills, Aptitude, and Communication skills.
- The curriculum offers multi-disciplinary courses running in the university for other fields/areas.

Course Components of Academic Program
M.Tech (Computer Science and Engineering)

Program Duration : 4 Semesters (2 Years)

Total Number of Credits : **80**

AICTE Course Components		Credits
1.	Humanities and Social Sciences including Management courses (HSMC)/SEC/VAC	6
2.	Laboratory Component (LC)	8
3.	Professional Core Courses (PCC)	21
4.	Open Elective Courses (OEC)	6
5.	Professional Elective Courses (PEC)	9
6.	Project work, seminar and internship in industry or elsewhere (PROJ)	30
	Total Credits	80

NEP Course Components		Credits
1.	Discipline Specific Core (DSC)	29
2.	Discipline Specific Elective (DSE)	9
3.	University Open Elective/Generic Elective (UOE)	6
4.	Value Added Course (VAC)	2
5.	Skill Enhancement Course (SEC)	4
6.	Project/Seminar/Internship/Summer training (PROJ)	30
	Total Credits	80

10. Scheme

Graphic Era (Deemed to be University)

M.Tech. in Computer Science and Engineering

Scheme of Teaching and Evaluation 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) as per NEP 2020

(Effective from the academic year 2025-26)

Semester I

COURSE MODULE					TEACHING PERIODS				WEIGHTAGE : EVALUATION			
COURSE				Credits	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
Code	Title	NEP Component	AICTE Component									
MCS102	Mobile Computing	DSC	PCC	3	3	-	-	3	25	25	50	100
MCS103	Advanced Operating Systems	DSC	PCC	3	3	-	-	3	25	25	50	100
MCS104	Networking Protocols	DSC	PCC	3	3	-	-	3	25	25	50	100
	Discipline Elective I	DSE	PEC	3	3	-	-	3	25	25	50	100
MCS153	Networking Protocols and Mobile Computing Lab	DSC	LC	2	-	-	4	4	25	25	50	100
MCS164	Computing Lab I	DSC	LC	2	-	-	4	4	25	25	50	100
MCS114	Research Methodology and IPR	VAC	VAC	2	2	-	-	2	25	25	50	100
GP101	General Proficiency	SEC	SEC	1	-	-	-	-	100	-	-	100
			Total	**19**								**800**

DISCIPLINE ELECTIVE COURSES:

ELECTIVE NO.	**ELECTIVES (COURSE CODE WITH NAME)**	
Discipline Elective-I	MCS124	Data Ware Housing and Mining
	MCS125	Cloud Computing
	MCS134	Internet of Things
	MCS129	Algorithms Design and Techniques
	MCS141	Wireless Sensor Networks
	MCS131	Applied Data Science
	MCS132	Applied Cyber Security
	MCS133	Applied AI using Python
	MCS128	Machine Learning

NOTE:

1. Generic Elective can also be opted from Swayam Portal and students should produce Grade certificate on successful completion of the course but the content should not match with the courses offered under the curriculum.
2. General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.

Graphic Era (Deemed to be University)

M.Tech. in Computer Science and Engineering

Scheme of Teaching and Evaluation 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) as per NEP 2020

(Effective from the academic year 2025-26)

Semester II

COURSE MODULE					TEACHING PERIODS				WEIGHTAGE : EVALUATION			
COURSE				Credits	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
Code	Title	NEP Component	AICTE Component									
MCS241	Computer Vision and its Applications	DSC	PCC	3	3	-	-	3	25	25	50	100
MCS202	Distributed Computing	DSC	PCC	3	3	-	-	3	25	25	50	100
MCS203	Artificial Intelligence & Expert Systems	DSC	PCC	3	3	-	-	3	25	25	50	100
	Discipline Elective-II	DSE	PEC	3	3	-	-	3	25	25	50	100
	Generic Elective-I	UOE	OEC	3	3	-	-	3	25	25	50	100
MCS254	Computing Lab II	DSC	LC	2	-	-	4	4	25	25	50	100
MCS252	Distributed Computing & AI Lab	DSC	LC	2	-	-	4	4	25	25	50	100
MCS211	Seminar	PROJ	PROJ	1	-	-	-	1	-	-	100	100
GP201	General Proficiency	SEC	SEC	1	-	-	-	1	100	-	-	100
			Total	**21**								**900**

DISCIPLINE ELECTIVE COURSES:

ELECTIVE NO.	**ELECTIVES (COURSE CODE WITH NAME)**	
Discipline Elective-II	MCS201	Advance Software Engineering
	MCS225	Developing Applications in the Cloud
	MCS226	Virtual and Augmented Reality
	MCS230	Blockchain Technology
	MCS228	Microservice Architecture
	MCS229	Information Retrieval and Natural Language Processing
	MCS241	Cyber Security and Laws
	MCS227	Information and communication theory

NOTE:

1. Generic Elective can also be opted from Swayam Portal and students should produce Grade certificate on successful completion of the course but the content should not match with the courses offered under the curriculum.
2. General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.

Graphic Era (Deemed to be University)

M.Tech. in Computer Science and Engineering

Scheme of Teaching and Evaluation 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) as per NEP 2020

(Effective from the academic year 2025-26)

Semester III

COURSE MODULE					TEACHING PERIODS				WEIGHTAGE : EVALUATION			
COURSE				Credits	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
Code	Title	NEP Component	AICTE Component									
MCS301	Soft Computing	DSC	PCC	3	3	-	-	3	25	25	50	100
	Discipline Elective-IV	DEC	PEC	3	3	-	-	3	25	25	50	100
MCS300	Dissertation-Phase I	PROJ	PROJ	10	-	-	20	20	25	25	50	100
	Generic Elective-II	UOE	OEC	3	3	-	-	3	25	25	50	100
MCS311	Seminar	PROJ	PROJ	1	-	-	-	-	-	-	100	100
GP301	General Proficiency	SEC	SEC	1	-	-	-	-	100	-	-	100
			Total	**21**								**600**

DISCIPLINE ELECTIVE COURSES:

ELECTIVE NO.	**ELECTIVES (COURSE CODE WITH NAME)**	
Discipline Elective-IV	MCS321	Service oriented cloud architecture
	MCS324	Intrusion detection system
	MCS325	Robotic Process Automation
	MCS326	Secure Coding Practices
	MCS327	Full Stack Web and Multiplatform Mobile App Development

NOTE:

1. Generic Elective can also be opted from Swayam Portal and students should produce Grade certificate on successful completion of the course but the content should not match with the courses offered under the curriculum.
2. General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.

Graphic Era (Deemed to be University)

M.Tech. in Computer Science and Engineering

Scheme of Teaching and Evaluation 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) as per NEP 2020

(Effective from the academic year 2025-26)

Semester IV

COURSE MODULE					TEACHING PERIODS				WEIGHTAGE : EVALUATION			
COURSE				Credits	L	T	P	Contact Hr.	CIE	MSE	ESE	Total
Code	Title	NEP Component	AICTE Component									
MCS400	Dissertation Phase-II	PROJ	PROJ	15	-	-	15	30	25	-	75	100
MCS411	Seminar	PROJ	PROJ	1	-	-	-		-	-	100	100
MCS462	Comprehensive Viva-Voce	PROJ	PROJ	2	-	-	-	-	-	-	100	100
GP401	General Proficiency	SEC	SEC	1	-	-	-	-	-	-	100	100
			Total	**19**								400

13. EXIT OPTIONS

SEM	Exit Option	Credits	Additional Credit	List of Exit Courses
I & II	Post-Graduate Diploma in Computer Science and Engineering	40	6	1. Generative AI and Large Language Models (Swayam) 2. Introduction to Quantum Computing: Quantum Algorithms and Qiskit (Swayam)
III & IV	Master of Technology in Computer Science and Engineering	80		

14. List of Potential Recruiters for Employing Graduates in Computer Science and Engineering

- Microsoft Corporation
- Google
- Adobe
- Amazon
- Walmart Global Technology
- Coforge
- TCS
- Infosys
- Capgemini
- HCL
- Informatica
- Teradata
- EY India
- 75Way Technologies
- Global Logic
- PWC
- Enquero Global
- HSBC
- Accenture
- Accolite
- Cognizant
- Vinculum
- Atlassian
- Airbus India
- Tally India
- Morgan Stanley
- Flipkart
- L&T Infotech
- Apps Associates
- Acuity Knowledge
- LTTS
- LTIMindtree
- IBM
- Zscaler
- Goldman Sachs
- Latent View
- Bonami Software
- Incture
- ANM
- Wissen Technologies
- DXC
- Contata
- Sopra Steria
- MAQ Software
- Intel
- Hexaware Technology
- Yamaha
- JSW
- Autopay
- Nineleaps
- American Express
- Salesforce
- Lowes India
- AbinBevGCC
- Siemens
- Deloitte And many more