CENTRE FOR ADVANCE STUDIES

(Dr. A.P.J. Abdul Kalam Technical University, U.P. , Lucknow)

Course Structure
For
M.Tech - Computer Science and Engineering (CSE)
With choice based specialization in - Cyber Security (CyS) /
Information and Communication Technologies (ICT)

Centre for Advance Studies (Dr. A.P.J. Abdul Kalam Technical University, U.P. , Lucknow) in its first year is starting with Master Of Technology in Computer Science & Engineering with choice based specialization in Cyber Security and ICT for the academic session 2017-18. The curriculum has been developed considering the present and future needs of industry and higher education. The Institute facilitates both industry ready and research based ambience to students with world class e-library, renowned faculties with expertise knowledge, cognitive pedagogy to achieve academic excellence and other services to the students.

The structure shall enable students some core courses to advance learning and research in the area of Computer Science & Engineering and will add flavors with Choice based specialization in Cyber Security and ICT. This is a specialized program aimed at providing the student with in-depth knowledge of domains in Computer Science and Engineering. The course structure will help students to develop knowledge and skill in the following proportionate:

70% Technical	○ Information Processing Platform, OS Security, Networking in a global Distributed Environment, Security Techniques, technical experience in industrial design, risk analysis, physical and data security and auditing techniques, VLSI design and communication , Pattern Recognition and Machine Learning , IoT and data science. ○ Excellent Visionary Skill that focus on scalability, cost effectiveness and implementation ease. ○ Industry as well as Research ambience.
15% Business Process & Managerial Practices	○ Know the Business Dynamics, Business Processes and good planning. ○ Willingness to manage a Multidisciplinary team or to

	personally execute necessary task.
15% Interpersonal	○ Consulting Skill, Communication Skill, Legal Understanding, ability to work with all management level and resolve issues, Business Need with Security Requirement.

M.Tech in Computer Science & Engineering with Specialization in Cyber Security aims at providing a strong background for students to get specialized knowledge to design solutions and management policy to build up a secure and reliable systems in the modern era of distributed computing. The course covers a Common Body of Knowledge (CBK) about the major 10 security domains for information security professionals defined by International Information Systems Security Certification Consortium (ISC^2) as:

- Cryptography
- Security Architecture and Design
- Operations Security
- Access Control
- Telecommunications and Network Security
- Information Security Governance and Risk Management
- Software Development Security
- Business Continuity and Disaster Recovery Planning
- Legal, Regulations, Investigations and Compliance

M.Tech in Computer Science & Engineering with Specialization in ICT program aims to provide exposure to students to learn the cutting edge of technology, research and development for solving real-world problems in bridging gap in urban and rural developments. The course enable students in broadening their knowledge of ICT disciplines, major area include:

- Machine Intelligence and Analytics
- Parallel & Distributed Computing
- Signal and Image Processing
- Communication Systems
- VLSI and embedded system
- Intelligent Systems and Security

Course Credit Distribution

M.Tech course is a full time two year program and classes will be held on all working days. The Program Structure has been design such that the students shall study the some core subjects of Computer Science and Engineering as well as the courses for specialization.

In Semester 1, students shall study Advance Core courses of Computer Science & Engineering (denoted as *). Hereafter, in Semester 2 and 3 students shall study in depth subject of Specialization with its core and elective subjects. Some courses are common to both specializations (marked as #). Semester IV is Thesis/ Dissertation.

There are mainly two types of courses - lecture courses and laboratory courses. Lecture courses consist of lecture (L) and tutorial (T) hours. Laboratory courses consist of practical (P) hours. The credit (C) for a course is dependent on the number of hours of instruction per week in that course, as given below:

(1) 1h/week of lecture (L) or tutorial (T) = 1 credit
(2) 2h/week of Practicals (P) = 1 credit
(3) Credit (C) for a Theory course = No. of hours of lectures per week + No. of hours of tutorials per week = L + T
(4) Credits (C) for a Laboratory course = ½ x No. of hours of laboratory course per week

Course Code Abbreviation :

MCCS – Core Course Common to both CyS and ICT
MECS – Elective Course Common to both CyS and ICT
MCCyS- Core Course for Cyber Security
MCICT- Core Course for ICT
MECyS- Elective Course for Cyber Security
MEICT- Elective Course for ICT

Category	Program Core for CSE	Specialization Core course	Specialization Electives course	Lab	Non-Teaching Credit Courses	Total Credits
Credits	15	23	12	16	30	96

Semester	Course Types	Credits	Total Credits
Semester 1			
1	Core Courses*	4 + 4 +4 +3= 15	24
1	Specialization courses	3	
1	Lab	2+2+2= 6	
Semester 2			
2	Specialization core courses	4 +4 + 4 = 12	24
2	Specialization elective courses #	3 +3=6	
2	Lab	2+2+2=6	
Semester 3			
3	Specialization core courses #	4 +4 = 8	24
3	Specialization elective courses	3 +3 = 6	
3	Lab #	2+2=4	
3	ISR / Minor Project	6	
Semester 4			
4	Dissertation	24	24
	Total Credit (For whole Program)		96

SEMESTER -I

S. No.	Course Code	Subject	Periods			Credits
			L	T	P	
CORE COURSES - COMPULSORY						
01.	MCCS-101	Analysis and designs of algorithm *	3	1	-	4 Credit * 3 = 12
02.	MCCS-102	Mobile and Wireless and Sensor Networks *				
03.	MCCS-103	Advanced Computer networks and communication *				
04.	MCCS-104	Cloud computing *	3	0	-	3
SPECIALISATION COURSE- ONLY ONE						
05.	MCCyS-101	Fundamental of Information Security& Practices	3	0	-	3
06.	MCICT-101	Mathematical foundations for Computing in ICT				
LAB / PRACTICAL						
07.	MCCS-111	Analysis and designs of algorithm Lab*	-	-	4	2 Credit * 3 = 6
08.	MCCS-112	Wireless Sensor Lab*				
09.	MCCS-113	Programming on Communication network Lab*				
						Total Credit =24

SEMESTER -II

S. No.	Course Code	Subject	Periods			Credits
			L	T	P	
CYBER SECURITY CORE COURSES - COMPULSARY						
01.	MCCyS-201	Cryptography	3	1	-	4 credit *3 = 12
02.	MCCyS-202	Digital Forensics in Cyber Crime and Data Protection Act				
03.	MCCyS-203	Ethical Hacking and Penetration Testing				
ICT CORES COURSES – COMPULSARY						
04.	MCICT-201	Embedded systems and VLSI Algorithm Design	3	1	-	4 credit *3 = 12
05.	MCICT-202	Pattern Recognition & Machine Learning				
06.	MCICT-203	Speech Communication and Biomedical Signal Processing				
CYBER SECURITY ELECTIVE COURSES - ANY TWO						
07.	MECS-201	Introduction to Formal Methods and Verification of Large Systems #	3	0	-	3 credit * 2 = 6
08.	MECyS-201	Information Security Governance and Security Standard (ISO 27000, COBIT, PCI DSS, HIPAA,ITIL)				
09.	MECyS-202	Business Continuity and Disaster Recovery Planning Management				
ICT ELECTIVE COURSES - ANY TWO						
10.	MECS-201	Introduction to Formal Methods and Verification of Large Systems #	3	0	-	3 Credit * 2 = 6
11.	MEICT-201	Software Design and Engineering				
12.	MEICT-202	Advance Algorithms in Parallel and distributed computing				

CYBER SECURITY LAB - COMPULSARY						
13.	MCCyS-211	Cryptography Lab	-	-	4	2 Credit *3 = 6
14.	MCCyS-212	Digital Forensics Lab				
15.	MCCyS-213	Ethical Hacking and Penetration Testing Lab				
ICT LAB - COMPULSARY						
16.	MCICT-211	Embedded systems and VLSI Algorithm Design	-	-	4	2 Credit * 3 =6
17.	MCICT-212	Pattern Recognition & Machine Learning				
18.	MCICT-213	Speech Communication and Biomedical Signal Processing				
						Total Credit = 24

SEMESTER -III

S. No.	Course Code	Subject	Periods			Credits
			L	T	P	
CYBER SECURITY CORE COURSES - COMPULSARY						
01.	MCCyS-301	Secure Software Design and Operating System Security	3	1	-	4 credit *2 = 8
02.	MCCS-301	Data Science (Big Data & analytics , IoT) #				
03.	MCCS-302	Minor Project (or Industry based) #	-	-	-	6
ICT CORES COURSES – COMPULSARY						
04.	MCICT-301	AI and Natural language processing	3	1	-	4 credit *2 = 8
05.	MCCS-301	Data Science (Big Data & analytics , IoT) #				
06.	MCCS-302	Minor Project (or Industry based) #	-	-	-	6

CYBER SECURITY ELECTIVE COURSES - ANY TWO						
07.	MECyS-301	Access Control and Data Base Security	3	0	-	3 credit *2 = 6
08.	MECyS-302	Project Management , Consultancy and Technical Auditing				
09.	MECyS-302	Identity and Access Management & Trusted Computing				
ICT ELECTIVE COURSES - ANY TWO						
10.	MEICT-301	Green ICT and Health informatics	3	0	-	3 credit *2 = 6
11.	MEICT-302	Intelligent system and technologies				
12.	MEICT-303	Data Base Management and Service oriented architecture				
CYBER SECURITY LAB - COMPULSARY						
13.	MCCyS-311	Secure Software Design and Operating System Security Lab	-	-	4	2 credit * 2 = 4
14.	MCCS-311	Data Science Lab #				
ICT LAB - COMPULSARY						
16.	MCICT-311	AI & NLP Lab	-	-	4	2 credit * 2 =4
17.	MCCS-311	Data Science Lab #				
						Total Credit = 24

SEMESTER -IV

S. No.	Course Code	Subject	Periods			Credits
			L	T	P	
01.	MCCS-401	Thesis /Dissertation #	-	-	-	24
						Total Credit =24