



IEM Salt Lake Campus, IEM Newtown Campus & IEM Jaipur Campus

Syllabus Outline

For

Master of Computer Applications

Effective from Academic Year 2026-2027

DEPARTMENT OF COMPUTER APPLICATIONS

MCA 1st SEMESTER

Course Code	Course Title	Total No. of Weekly Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Lectures	
1st Semester (Theory)						
MCA101	Computer Organisation and Architecture	4	1	0	5	3
MCA102	Computer Programming with C	4	1	0	5	4
MCA103	Data Structures with C	4	1	0	5	4
MCA105	Business English and Communication	3	1	0	4	3
MCA106	Computational Mathematics and Statistics	4	1	0	5	4
MCAGS101	Mental Maths for Professionals - I	2	1	0	3	1
Total of Theory					27	19
1st Semester (Practical)						
MCA192	C Programming Laboratory	0	0	4	4	3
MCA193	Data Structures Laboratory using C	0	0	3	3	3
Total of Practical					7	6
1st Semester (Sessional)						
MCA171	Research Methodology and IPR	2	1	0	3	2
MCA172	Python Programming Fundamentals	0	0	3	3	2
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCs	Massive Open Online Course	0	0	0	0	0
Total of Sessional					6	4
Total of the Semester					40	29

NPTEL Courses for MCA 1st Semester

Note: NPTEL course is mandatory from the 2nd semester onwards. However, students are encouraged to enroll in relevant NPTEL courses to enhance their knowledge and skills.

The list of available NPTEL courses can be accessed here:

https://docs.google.com/spreadsheets/d/e/2PACX1vT0VPb0_8Klf6b_vmnf2xeMF0eb79YX3rmIuZjuxxIkGA7Kadg_WLLatvIM1c9QQ1PZQPZvSjL3FKhB/pubhtml?urp=gmail_link

MCA 1st Semester Phygital Learning Subjects

(At least one certification from each pool for the subjects is mandatory)

1. Computer Organisation and Architecture -

- A. Coursera Course: <https://www.coursera.org/learn/comparch>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/introduction-to-it-architecture/it-architecture-overview?u=229219690>

2. Computer Programming with C –

- A. Coursera Course: <https://www.coursera.org/specializations/c-programming>
- B. LinkedIn Learning Course: https://www.linkedin.com/learning/complete-guide-to-c-programming-foundations?upsellOrderOrigin=default_guest_learning&trk=default_guest_learning

3. Data Structures with C –

- A. Coursera Course: <https://www.coursera.org/learn/data-structures>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/programming-foundations-data-structures-22859292>

4. Business English and Communication –

- A. Coursera Course: <https://www.coursera.org/programs/iem-faculty-learning-program-rttyr7/specializations/business-english?source=search>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/paths/build-your-business-english-skills-as-a-non-native-speaker?u=229219690>

5. Computational Mathematics and Statistics –

- A. Coursera Course: <https://www.coursera.org/learn/machine-learning-probability-and-statistics>
- B. LinkedIn Learning Course: https://www.linkedin.com/learning/statistics-foundations-1-the-basics?trk=learning-topics_trending-courses_related-content-card&upsellOrderOrigin=default_guest_learning

MCA 2nd SEMESTER

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
2 nd Semester (Theory)						
MCA201	Database Management System	3	1	0	4	4
MCA202	Object-Oriented Programming with Java	3	1	0	4	4
MCA203	Data Communication & Computer Networks	3	1	0	4	4
MCA204	Advanced-Data Structures with C	3	1	0	4	4
MCA(GS)201	General Studies & Current Affairs-II	2	0	0	2	0.5
Total of Theory					18	16.5
2 nd Semester (Practical)						
MCAC291	Database Management System Laboratory	0	0	3	3	3
MCAC292	Object-Oriented Programming with Java Laboratory	0	0	3	3	3
MCAC294	Advanced-Data Structures with C Laboratory	0	0	3	3	3
Total of Practical					9	9
2 nd Semester (Sessional)						
IVC282	Economics, Finance and Entrepreneurship Skills - Intermediate	0	0	0	2	0
MCA(GS)281	Competitive Aptitude Training - II	2	0	0	2	0.5
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCs	Massive Open Online Course	0	0	0	0	0
Total of Sessional					2	0.5
Total of Semester					29	26

NPTEL Courses for MCA 2nd Semester
(Any one certification is mandatory)

1. **Database Management System:** https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_cs91
2. **Object-Oriented Programming with Java:** https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs153
3. **Data Communication & Computer Networks:** https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs99

MCA 2nd Semester Phygital Learning Subjects
(At least one certification from each pool for the subjects is mandatory)

1. Database Management System:

- A. Coursera Course: <https://www.coursera.org/learn/introduction-to-relational-databases>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/learning-relational-databases-2/database-management-systems-dbms?u=229219690>

2. Object-Oriented Programming with Java:

- A. Coursera Course: <https://www.coursera.org/specializations/object-oriented-programming/>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/paths/getting-started-as-a-java-developer?u=229219690>

3. Data Communication & Computer Networks:

- A. Coursera Course: <https://www.coursera.org/browse/information-technology/networking>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/cisco-ccna-200-301-cert-prep-1-network-fundamentals-and-access>

4. Advanced-Data Structures with C:

- C. Coursera Course: <https://www.coursera.org/programs/iem-faculty-learning-program-rtvr7/learn/packt-advanced-data-structures-and-problem-solving-techniques-xaq38?source=search>
- D. LinkedIn Learning Course: <https://www.linkedin.com/learning/python-data-structures-and-algorithms/python-data-structures-and-algorithms-in-action?u=229219690>

MCA 3rd SEMESTER

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
3 rd Semester (Theory)						
MCA301	Operating Systems and Systems Software	4	1	0	5	4
MCA302	Software Engineering & TQM	4	1	0	5	4
MCA304	Statistics and Numerical Techniques	3	1	0	4	3
MCA305	Artificial Intelligence and Machine Learning	4	1	0	5	4
MCAGS301	General Studies & Current Affairs-III	2	0	0	2	0.5
Total of Theory					21	15.5
3 rd Semester (Practical)						
MCA391	Operating Systems Laboratory (Unix)	0	0	2	2	3
MCA392	Software Project Management Laboratory	0	0	2	2	3
MCA395	Artificial Intelligence and Machine Learning Laboratory (PYTHON)	0	0	2	2	3
Total of Practical					6	9
3 rd Semester (Sessional)						
MCA371	Sustainability, Climate Action and Environmental Sciences	2	1	0	3	2
MCA381	Industrial Training	0	0	0	0	2
MCA382	Minor Project	0	0	0	8	6
MCA373	Seminar	0	0	0	0	1
MCAGS381	Competitive Aptitude Training - III	2	0	0	2	0.5
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCS	Massive Open Online Courses	0	0	0	0	0
Total of Sessional					13	11.5
Total of the Semester					40	36

NPTEL Courses for MCA 3rd Semester

Note: NPTEL is not mandatory in the 3rd semester. However, students are encouraged to enroll in relevant NPTEL courses to enhance their knowledge and skills.

The list of available NPTEL courses can be accessed here:

https://docs.google.com/spreadsheets/d/e/2PACX1vT0VPb0_8Klf6b_vmnf2xeMF0eb79YX3rmIuZjuxxkGA7Kadg_WLLatyIM1c9QQ1PZQPZvSjL3FKhB/pubhtml?urp=gmail_link

MCA 3rd Semester Phygital Learning Subjects

(At least one certification from each pool for the two subjects is mandatory)

1. Operating Systems and Systems Software:

- A. Coursera Course: <https://www.coursera.org/specializations/codio-introduction-operating-systems>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/iot-foundations-operating-systems-fundamentals/welcome?u=229219690>
- C. Infosys Springboard Course: https://infyspringboard.onwingspan.com/web/en/login?ref=%2Fapp%2Ftoc%2Fflex_auth_0135015677134110729950%2Foverview

2. Software Engineering & TQM:

- A. Coursera Course: <https://www.coursera.org/learn/introduction-to-software-engineering>
- B. LinkedIn Learning Course: https://www.linkedin.com/learning/software-engineering-principles-by-pearson?upsellOrderOrigin=default_guest_learning&trk=default_guest_learning

Learning Pathway MCA 3rd Semester

(At least one certification from the given pool of subjects is mandatory within the duration of 2nd Year)

1. **Data Science:** <https://www.coursera.org/specializations/jhu-data-science>

2. **AI Agent Developer:** <https://www.coursera.org/specializations/ai-agents>

3. **Generative AI Software Engineering Specialization:** <https://www.coursera.org/specializations/generative-ai-software-engineering>

4. **IBM DevOps, Cloud, and Agile Foundations:** <https://www.coursera.org/specializations/devops-cloud-and-agile-foundations>
5. **Advanced Machine Learning on Google Cloud:** <https://www.coursera.org/specializations/advanced-machine-learning-tensorflow-gcp>
6. **Data Engineering, Big Data, and Machine Learning on GCP:** <https://www.coursera.org/specializations/gcp-data-machine-learning>
7. **Modern Data Architecture & Lakehouse Engineering:** <https://www.coursera.org/specializations/modern-data-architecture-and-lakehouse-engineering>
8. **Building AI Cloud Apps with Microsoft Azure:** <https://www.coursera.org/specializations/building-ai-cloud-apps-microsoft-azure>
9. **Fundamentals of Computer Network Security:** <https://www.coursera.org/specializations/computer-network-security>
10. **Modern Data Analytics with Python, Excel & Generative AI:** <https://www.coursera.org/specializations/modern-data-analytics-with-python-excel-and-genai>
11. **Linux and Private Cloud Administration on IBM Power Systems:** <https://www.coursera.org/specializations/linux-private-cloud-administration-power-systems>
12. **Exam Prep: AWS Certified DevOps Engineer – Professional:** <https://www.coursera.org/specializations/exam-prep-dop-c02-aws-certified-devops-engineer-professional>
13. **Exam Prep (DEA-C01): AWS Certified Data Engineer – Associate:** <https://www.coursera.org/specializations/exam-prep-aws-certified-data-engineer-associate>
14. **Intermediate to Advanced: Professional Figma UI / UX Design:** <https://www.coursera.org/specializations/intermediatetoadvancedprofessionalfigma-ui-uxdesign>
15. **Mastering Operating Systems with IBM AIX:** <https://www.coursera.org/specializations/mastering-operating-systems-with-ibm-aix>
16. **Mastering AI: Neural Nets, Vision System, Speech Recognition:** <https://www.coursera.org/specializations/mastering-ai-neural-nets-vision-speech>
17. **AI Security: Security in the Age of Artificial Intelligence:** <https://www.coursera.org/specializations/ai-security-security-in-the-age-of-artificial-intelligence>

18. **Data Engineering on AWS - The Complete Training:** <https://www.coursera.org/specializations/packt-data-engineering-on-aws-complete-training>

19. **Applied Python: Web Dev, Machine Learning & Cryptography:** <https://www.coursera.org/specializations/applied-python-web-dev-machine-learning-cryptography>

20. **Big Data Foundations with Hadoop and Spark:** <https://www.coursera.org/specializations/packt-big-data-foundations-with-hadoop-and-spark>

MCA 4th SEMESTER

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
4 th Semester (Theory)						
MCA401 A/B/C/D	Elective - I	3	1	0	4	3
MCA402 A/B/C	Elective - II	3	1	0	4	3
MCA403	Values and Ethics	2	0	0	2	1
MCA405	Management & Accounting	2	0	0	2	2
MCA(GS)401	General Studies & Current Affairs - IV	2	0	0	2	0.5
Total of Theory					14	9.5
4 th Semester (Practical)						
MCA491	Major Project	0	0	10	10	15
Total of Practical					10	15
4 th Semester (Sessional)						
MCA(GS)481	Competitive Aptitude Training - IV	2	0	0	2	0.5
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCS	Massive Open Online Courses	0	0	0	0	0
Total of Sessional					2	2.5
Total of Semester					31	27

Elective No.	Course Code	Topic	Elective No.	Course Code	Topic
I	MCA401A	Distributed Database Management	II	MCA402A	Compiler Design
	MCA401B	Image Processing		MCA402B	Mobile Computing
	MCA401C	Parallel Programming		MCA402C	Embedded Systems
	MCA401D	Cloud Computing		MCA402D	Natural Language Processing

NPTEL Courses for MCA 4th Semester

Note: NPTEL is not mandatory in the 4th semester. However, students are encouraged to enroll in relevant NPTEL courses to enhance their knowledge and skills.

The list of available NPTEL courses can be accessed here:

https://docs.google.com/spreadsheets/d/e/2PACX1vT0VPb0_8Klf6b_vmnf2xeMF0eb79YX3rmIuZjuxxIkGA7Kadg_WLLatyIM1c9QQ1PZQPZvSjL3FKhB/pubhtml?urp=gmail_link

MCA 4th Semester Phygital Learning Subjects

(At least one certification from each pool for the two subjects is mandatory)

1. Image Processing:

- A. Coursera Course: <https://www.coursera.org/programs/iem-faculty-learning-program-rtyr7/learn/introduction-image-processing?source=search>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/hands-on-ai-image-processing-with-python/computer-vision-under-the-hood?u=229219690>

2. Natural Language Processing:

- A. Coursera Course: <https://www.coursera.org/programs/iem-faculty-learning-program-rtyr7/specializations/natural-language-processing?source=search>
- B. LinkedIn Learning Course: <https://www.linkedin.com/learning/natural-language-processing-nlp-fundamentals-by-pearson/natural-language-processing-nlp-fundamentals-introduction?u=229219690>

Learning Pathway MCA 4th Semester

(At least one certification from the given pool of subjects is mandatory within the duration of 2nd Year)

- 1. **Data Science:** <https://www.coursera.org/specializations/jhu-data-science>
- 2. **AI Agent Developer:** <https://www.coursera.org/specializations/ai-agents>
- 3. **Generative AI Software Engineering Specialization:** <https://www.coursera.org/specializations/generative-ai-software-engineering>
- 4. **IBM DevOps, Cloud, and Agile Foundations:** <https://www.coursera.org/specializations/devops-cloud-and-agile-foundations>

5. Advanced Machine Learning on Google Cloud: https://www.coursera.org/specializations/advanced-machine-learning-tensorflow-gcp
6. Data Engineering, Big Data, and Machine Learning on GCP: https://www.coursera.org/specializations/gcp-data-machine-learning
7. Modern Data Architecture & Lakehouse Engineering: https://www.coursera.org/specializations/modern-data-architecture-and-lakehouse-engineering
8. Building AI Cloud Apps with Microsoft Azure: https://www.coursera.org/specializations/building-ai-cloud-apps-microsoft-azure
9. Fundamentals of Computer Network Security: https://www.coursera.org/specializations/computer-network-security
10. Modern Data Analytics with Python, Excel & Generative AI: https://www.coursera.org/specializations/modern-data-analytics-with-python-excel-and-genai
11. Linux and Private Cloud Administration on IBM Power Systems: https://www.coursera.org/specializations/linux-private-cloud-administration-power-systems
12. Exam Prep: AWS Certified DevOps Engineer – Professional: https://www.coursera.org/specializations/exam-prep-dop-c02-aws-certified-devops-engineer--professional
13. Exam Prep (DEA-C01): AWS Certified Data Engineer – Associate: https://www.coursera.org/specializations/exam-prep-aws-certified-data-engineer-associate
14. Intermediate to Advanced: Professional Figma UI / UX Design: https://www.coursera.org/specializations/intermediate-to-advanced-professional-figma-ui-ux-design
15. Mastering Operating Systems with IBM AIX: https://www.coursera.org/specializations/mastering-operating-systems-with-ibm-aix
16. Mastering AI: Neural Nets, Vision System, Speech Recognition: https://www.coursera.org/specializations/mastering-ai-neural-nets-vision-speech

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| 17. AI Security: Security in the Age of Artificial Intelligence: https://www.coursera.org/specializations/ai-security-security-in-the-age-of-artificial-intelligence |
| 18. Data Engineering on AWS - The Complete Training: https://www.coursera.org/specializations/packt-data-engineering-on-aws-complete-training |
| 19. Applied Python: Web Dev, Machine Learning & Cryptography: https://www.coursera.org/specializations/applied-python-web-dev-machine-learning-cryptography |
| 20. Big Data Foundations with Hadoop and Spark: https://www.coursera.org/specializations/packt-big-data-foundations-with-hadoop-and-spark |