MUJ Faculty of Engineering

Bachelor's in Technology in Computer Science and Bioscience (2025-2026) onwards (160 Credits)

	First Semester	
Code	Course Name	Cr
CHY1001	Engineering Chemistry & Lab	3
MAS1001	Calculus & Matrices	3
ECE1001	Digital Systems	3
MEE1009	Manufacturing Processes	3
CSCXXXX	Problem-Solving Using Computers	3
DOA1001	Human Rights and Values	1
CSCXXXX	Problem-Solving Using Computers Lab	1
LLC1011	Communication Skills	2
MEE1036	Engineering Graphics	1
	First Semester Credits	**20**

	Second Semester	
Code	Course Name	Cr
PHY1001	Engineering Physics & Lab	4
MAS1002	Computational Mathematics	3
CHY1002	Environmental Studies	2
CSCXXXX	Fundamentals of Data Structures	3
CSCXXXX	Data Visualization	2
MEE1038	Creativity & Innovation IDEA Lab	2
BIT1001	Biology for Engineers	2
CSCXXXX	Fundamentals of Data Structure Lab	1
DOA1002	Wellness and Community Services	1
	Second Semester Credits	**20**

Code	Third Semester Course Name	Cr
CSB2103	Fundamentals of Molecular Biology and Genetics	4
MBB21xx	Principles of Management/ Engineering Economics	3
CSB2105	Data Structure and Algorithms	4
CSB2106	Relational Database Management System	4
CSB2107	Object oriented Programming	4
CSB2130	Relational Database Management System Lab	1
CSB2132	Data Structure and Algorithms Lab	1
CSB2133	Basic Analytical Lab	1
	Third Semester Credits	**22**

Code	Fourth Semester Course Name	Cr
MAS20XX	Probability and Statistics	3
CSB2202	Design and Analysis of Algorithms	4
MBB21xx	Principles of Management/ Engineering Economics	3
CSB2205	Artificial Intelligence	4
LLCXXXX	Technical Report Writing	2
CSB2204	Bioinformatics	4
CSB2231	Design and Analysis of Algorithms Lab	1
CSB2232	Bioinformatics Lab	2
CSB2271	Project Based Learning – 1	3
	Fourth Semester Credits	**26**

Code	Fifth Semester Course Name	Cr
CSB3102	Computational and Structural Biology	4
CSB3103	Data Science and Machine Learning	4
CSB3104	Information System Security	4
CSB3105	Recombinant DNA Technology	4
CSBXXXX	Program Elective 1	3
CSB3130	Computational and Structural Biology Lab	2
CSB3132	Data Science and Machine Learning Lab	1
CSB3171	Project Based Learning - 2	1
	Fifth Semester Credits	23

Code	Sixth Semester Course Name	Cr
	Sixth Semester	
Code	Course Name	Cr
CSB3203	Immunodiagnostics and Vaccine Technology	4
CSB3204	Genomics and Proteomics	4
CSBXXXX	***Industry Elective (PBL -3)	3
CSBXXXX	Program Elective 2	3
CSBXXXX	Program Elective 3	3
CSBXXXX	Program Elective 4	3
XXXXXXX	Open Elective	3
	Sixth Semester Credits	23

Code	Seventh Semester Course Name	Cr
XXXXXXX	Open Elective	3
XXXXXXX	Open Elective	3
CSBXXXX	Program Elective 5	3
CSBXXXX	Program Elective 6	3
CSB4170	Internship (Industry/ Research/ Industry Certification)	2
	Seventh Semester Credits	14

Code	Eighth Semester Course Name	Cr
CSB4270	Major Project	12
	Eighth Semester Credits	12

Legend:

Green: Other Departmental Courses

Orange: CSE Courses

Blue: Departmental Courses

Black: Program Elective Courses

Brown: Open Elective Courses

MUJ Faculty of Engineering

Bachelor's in Technology in Computer Science and Bioscience (2025-2026) onwards

Minor Specialization/ Honors (160 +18 Credits)

	First Semester	
Code	Course Name	Cr
CHY1001	Engineering Chemistry & Lab	3
MAS1001	Calculus & Matrices	3
ECE1001	Digital Systems	3
MEE1009	Manufacturing Processes	3
CSCXXXX	Problem-Solving Using Computers	3
DOA1001	Human Rights and Values	1
CSCXXXX	Problem-Solving Using Computers Lab	1
LLC1011	Communication Skills	2
MEE1036	Engineering Graphics	1
	First Semester Credits	**20**

	Second Semester	
Code	Course Name	Cr
PHY1001	Engineering Physics & Lab	4
MAS1002	Computational Mathematics	3
CHY1002	Environmental Studies	2
CSCXXXX	Fundamentals of Data Structures	3
CSCXXXX	Data Visualization	2
MEE1038	Creativity & Innovation IDEA Lab	2
BIT1001	Biology for Engineers	2
CSCXXXX	Fundamentals of Data Structure Lab	1
DOA1002	Wellness and Community Services	1
	Second Semester Credits	**20**

Code	Third Semester Course Name	Cr
CSB2103	Fundamentals of Molecular Biology and Genetics	4
MBB21xx	Principles of Management/ Engineering Economics	3
CSB2105	Data Structure and Algorithms	4
CSB2106	Relational Database Management System	4
CSB2107	Object oriented Programming	4
CSB2130	Relational Database Management System Lab	1
CSB2132	Data Structure and Algorithms Lab	1
CSB2133	Basic Analytical Lab	1
	Third Semester Credits	**22**

Code	Fourth Semester Course Name	Cr
MAS20XX	Probability and Statistics	3
CSB2202	Design and Analysis of Algorithms	4
MBB21xx	Principles of Management/ Engineering Economics	3
CSB2205	Artificial Intelligence	4
LLCXXXX	Technical Report Writing	2
CSB2204	Bioinformatics	4
CSB2231	Design and Analysis of Algorithms Lab	1
CSB2232	Bioinformatics Lab	2
CSB2271	Project Based Learning – 1	3
	Fourth Semester Credits	**26**

Code	Fifth Semester Course Name	Cr
CSB3102	Computational and Structural Biology	4
CSB3103	Data Science and Machine Learning	4
CSB3104	Information System Security	4
CSB3105	Recombinant DNA Technology	4
CSBXXXX	Program Elective 1	3
CSB3130	Computational and Structural Biology Lab	2
CSB3132	Data Science and Machine Learning Lab	1
CSB3171	Project Based Learning - 2	1
CSBXXXX	*Minor Specialization - 1/ Honors	3
	Fifth Semester Credits	23
	Minor Specialization/ Honors Credits	26

Code	Sixth Semester Course Name	Cr
	Sixth Semester	
Code	Course Name	Cr
CSB3203	Immunodiagnostics and Vaccine Technology	4
CSB3204	Genomics and Proteomics	4
CSBXXXX	***Industry Elective (PBL -3)	3
CSBXXXX	Program Elective 2	3
CSBXXXX	Program Elective 3	3
CSBXXXX	Program Elective 4	3
XXXXXXX	Open Elective	3
CSBXXXX	*Minor Specialization -2/ Honors	3
	Sixth Semester Credits	23
	Minor Specialization/ Honors Credits	26

Code	Seventh Semester Course Name	Cr
XXXXXXX	Open Elective	3
XXXXXXX	Open Elective	3
CSBXXXX	Program Elective 5	3
CSBXXXX	Program Elective 6	3
CSB4170	Internship (Industry/ Research/ Industry Certification)	2
CSBXXXX	*Minor Specialization -3 / Honors	3
CSBXXXX	*Minor Specialization -4 / Honors	3
	Seventh Semester Credits	14
	Minor Specialization/ Honors Credits	20

Code	Eighth Semester Course Name	Cr
CSB4270	Major Project	12
CSBXXXX	**Minor Specialization/ Honors (Research Project)	18
	Eighth Semester Credits	12
	Minor Specialization/ Honors Credits	18

Proposed Specializations

Artificial Intelligence and Machine Learning	Cyber Security
1. Deep Learning (PE-2) 2. Advance Machine Learning Techniques (PE-3) 3. Natural Language Processing (PE-4) 4. Computer Vision and Pattern Recognition (PE-5) 5. Project Based Learning- 4 (PE-6)	1. Essentials of Cyber Security (PE-2) 2. Ethical Hacking (PE-3) 3. Blockchain Technology (PE-4) 4. Digital Forensics & Privacy Preservation (PE-5) 5. Project Based Learning-4 (PE-6)
Data Science	**Internet of Things**
1. Data Visualization (PE-2) 2. Big Data Analytics (PE-3) 3. Deep Learning (PE-4) 4. Information Retrieval (PE-5) 5. Project Based Learning -4 (PE-6)	1. Introduction to IoT (PE-2) 2. Privacy and Security in IoT (PE-3) 3. Industrial IoT (PE-4) 4. Cyber Physical System 5. Project Based Learning -4 (PE-6)
Data Science in Biology	**Medical and Health Bioinformatics**
1. Python Programming for Biotechnologists (PE 2) 2. R programming for Bioscience (PE 3) 3. Data mining and Machine Learning for Bioinformatics (PE 4) 4. Neural Networks (PE 5) 5. Bioperl (PE 6)	1. Data Management in Healthcare Analytics (PE 2) 2. Forensic Science and Technology (PE 3) 3. Cheminformatics and QSAR (PE 4) 4. Artificial Intelligence and Cloud Computing in Healthcare (PE 5) 5. Legal and Ethical Aspects of Health Informatics (PE 6)

Industry Elective

1. Project Based Learning-3	1. Industry Elective 1- Analytics Insights 2. Industry Elective 2 3. Industry Elective 3

Program Elective 1/ Program Elective 6

1. Computer Vision 2. Computer Graphics and Multimedia Systems 3. Social Network Analysis 4. Augmented and Virtual Reality 5. High Performance Computing 6. Image Processing and Application 7. Quantum Computing 8. Nature Inspired Computing	9. Compiler Design 10. Software Testing 11. Protein Engineering 12. Metabolic Engineering 13. Comparative and Functional Genomics 14. Metagenomics 15. Synthetic biology

Program Elective 6 * Students pursuing a specialization will undertake a project relevant to their chosen field

Development Oriented Project

Design Oriented Project

Lab Oriented Project

Study Oriented Project

****Minor Specialization/ Honors (Research Project): Students pursuing Minor Specialization/ Honors will undertake 18 Credit Project in VIII Sem, related to specialization.**

“Big Data, Genes and Medicine” as a value- added course is offered by Coursera. The details of the course are:

Link for the course: https://www.coursera.org/learn/data-genes-medicine

Instructor: Isabelle Bichindaritz, Associate Professor, The State University of New York

Dr. Isabelle Bichindaritz is an associate professor in Computer Science and Director of Biomedical Informatics at SUNY Oswego. Following receiving a PhD in Computer Science from the University René Descartes – Paris V, Dr. Bichindaritz served as a research scientist at the Fred Hutchinson Cancer Research Center in Seattle and as assistant professor and professor at the University of Washington, Tacoma Institute of Technology and the National School of Public Health. Her research focuses on intelligent learning systems and biomedical data science for decision analytics and data analytics in healthcare and biomedical research, as well as more broadly artificial intelligence in medicine. She has authored or co-authored more than 100 papers in peer reviewed journals and conferences.

Description: This course distills students for expert knowledge and skills mastered by professionals in Health Big Data Science and Bioinformatics. Students will learn exciting facts about the human body biology and chemistry, genetics, and medicine that will be intertwined with the science of Big Data and skills to harness the avalanche of data openly available at fingertips and which are just starting to make sense of. They will investigate the different steps required to master Big Data analytics on real datasets, including Next Generation Sequencing data, in a healthcare and biological context, from preparing data for analysis to completing the analysis, interpreting the results, visualizing them, and sharing the results.

Needless to say, when they master these high-demand skills, they will be well positioned to apply for or move to positions in biomedical data analytics and bioinformatics. No matter what their skill levels are in biomedical or technical areas, they will gain highly valuable new or sharpened skills that will make them stand-out as a professional and want to dive even deeper in biomedical Big Data. It is hoped that this course will spark student interest in the vast possibilities offered by publicly available Big Data to better understand, prevent, and treat diseases.

There are 6 modules in this course which can be completed in 4 weeks with 10 hours per week.