

# UM-DAE Centre for Excellence in Basic Sciences

## *Outline and Credits of the course structure for 5-years integrated M. Sc. Degree*

- Minimum total credits for integrated M.Sc. degree is 240.
- 1<sup>st</sup> Year [semester-I (23 credits) and semester-II (23 credits)] is common to all the students
- Subject specific teaching and project begins from 2<sup>nd</sup> year (III-Semester onwards)
- IX-Semester (24 credits) is a full-time project work
- X-Semester is elective course
- 1<sup>st</sup> August to 30 November: Semesters-I, III, V, VII and IX  
1<sup>st</sup> January to 30 April: Semesters-II, IV, VI, VIII and X
- **Contact Hrs / per week: Lecture (L) – Tutorial (T) – Practical (P)**

*(Abbreviation: B = Biology; BL = Biology Laboratory; BPr = Biology Project; C = Chemistry; CL = Chemistry Laboratory; CPr = Chemistry Project; GL = General Laboratory; H = Humanities and Social Sciences; M = Mathematics; MPr = Mathematics Project; P = Physics; PL = Physics Laboratory; PPr = Physics Project)*

**FIRST YEAR**  
**(Common to all the students)**  
**SEMESTER –I (August- November)**  
**Total credits for semester-I = 23**

Subject Code	Subject	Contact Hrs / per week Lecture - Tutorial - Practical	Credits
<b>B-101</b>	Biology-I (Introductory Biology)	2+1+0	3
<b>C-101</b>	Chemistry-I (Structures & Bonding)	2+1+0	3
<b>P-101</b>	Physics-I (Classical Physics)	2+1+0	3
<b>M-100/ M-101*</b>	Mathematics-I	2+1+0	3
<b>H-101</b>	Communication Skills-I	3+0+0	3
<b>BL-101</b>	Biology Laboratory-I	0+1+2	2
<b>CL-101</b>	Chemistry Laboratory-I	0+1+2	2
<b>PL-101</b>	Physics Laboratory-I	0+1+2	2
<b>GL-101</b>	Computer Basics	0+1+2	2
<b>Total credits for Semester-I</b>			<b>23</b>

**SEMESTER –II (January-April)**  
**Total credits for semester-II = 23**

Subject Code	Subject	Contact Hrs / per week Lecture -Tutorial-Practical	Credits
<b>B-201</b>	Biology-II (Introduction to Macromolecules)	2+1+0	3
<b>C-201</b>	Chemistry-II (Chemical Thermodynamics)	2+1+0	3
<b>P-201</b>	Physics-II (Modern Physics)	2+1+0	3
<b>M-200/M-201*</b>	Mathematics-II	2+1+0	3
<b>H-201</b>	Communication Skills-II	3+0+0	3
<b>BL-201</b>	Biology Laboratory-II	0+1+2	2
<b>CL-201</b>	Chemistry Laboratory-II	0+1+2	2
<b>PL-201</b>	Physics Laboratory-II	0+1+2	2
<b>GL 201</b>	Electronics Laboratory	0+1+2	2
<b>Total credits for Semester-II</b>			<b>23</b>

\*M-100 and M-200 are for the students who did not have mathematics in 12<sup>th</sup> Standard, while M-101 and M-201 are for those who had mathematics in 12<sup>th</sup> Standard  
All the laboratory courses in 1<sup>st</sup> year will run for two months for a given student.

**SECOND YEAR**  
**SEMESTER –III (August to November)**  
**Total credits for semester-IV = 23-27**

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> Contact Hrs: L + T + P = Credits		<b>BIOLOGY</b> Contact Hrs: L + T + P = Credits		<b>MATHEMATICS</b> Contact Hrs: L + T + P = Credits	
<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>
<b>B-301</b>	Biochemistry-I (3+1+0 = 4)	<b>P-301</b>	Classical Mechanics-I (3+1+0 = 4)	<b>B-301</b>	Biochemistry –I (3+1+0 = 4)	<b>M-301</b>	Foundation (3+2+0 = 5)
<b>C-301</b>	Mathematics for Chemists & Biologists (3+1+0 = 4)	<b>P-302</b>	Mathematical Physics-I (3+1+0 = 4)	<b>C-301</b>	Mathematics for Chemists & Biologists (3+1+0 = 4)	<b>M-302</b>	Analysis-I (Single Variable Analysis) (3+2+0 = 5)
<b>C-302</b>	Organic Chemistry-I (3+1+0 = 4)	<b>P-303</b>	Electromagnetism-I (3+1+0 = 4)	<b>C-302</b>	Organic Chemistry-I (3+1+0 = 4)	<b>M-303</b>	Algebra I (Groups and Rings) (3+2+0 = 5)
<b>C-303</b>	Inorganic Chemistry-I (3+1+0 = 4)	<b>P-304</b>	Waves, Oscillations and Optics (3+1+0 = 4)	<b>B-302</b>	Cell Biology-I (3+1+0 = 4)	<b>M-304</b>	Elementary Number Theory (3+2+0 = 5)
<b>H-301</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-301</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-301</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-301</b>	Humanities and Social Science (3+0+0 = 3)
<b>CL-301</b>	Chemistry Laboratory (0+0+6 = 6)	<b>PL-301</b>	Physics Laboratory (0+0+6 = 6)	<b>BL-301</b>	Biology Laboratory (0+0+6 = 6)	<b>P-301</b>	Classical Mechanics - I (3+1+0 = 4)
<b>Credits</b>	<b>23 (69)</b>		<b>23 (69)</b>		<b>23 (69)</b>		<b>27 (73)</b>

## SEMESTER –IV (January-April)

Total credits for semester-IV = 26-28

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> (Contact Hrs: L + T + P = Credits)		<b>BIOLOGY</b> (Contact Hrs: L + T + P = Credits)		<b>MATHEMATICS</b> (Contact Hrs: L + T + P = Credits)	
Code	Subject	Code	Subject	Code	Subject	Code	Subject
<b>C-401</b>	Spectroscopy-I (3+1+0 = 4)	<b>P-401</b>	Mathematical Physics -II (3+1+0 = 4)	<b>C-401</b>	Spectroscopy-I (3+1+0 = 4)	<b>M-401</b>	Analysis-II (Multivariate Analysis) (3+2+0 = 5)
<b>C-402</b>	Physical Chemistry-I (3+1+0 = 4)	<b>P-402</b>	Quantum Mechanics-I (3+1+0 = 4)	<b>C-402</b>	Physical Chemistry-I (3+1+0 = 4)	<b>M-402</b>	Algebra-II (Linear Algebra) (3+2+0 = 5)
<b>C-403</b>	Quantum Chemistry-I (3+1+0 = 4)	<b>P-403</b>	Classical Mechanics-II (3+1+0 = 4)	<b>B-401</b>	Biochemistry –II (3+1+0 = 4)	<b>M-403</b>	Topology-I (3+2+0 = 5)
<b>C-404</b>	Organic Chemistry-II (3+1+0 = 4)		Elective-I (Out of Stream Elective) (3+1+0 = 4)	<b>B-402</b>	Molecular Biology (3+1+0 = 4)	<b>M-404</b>	Discrete Mathematics (3+2+0 = 5)
<b>CL-401</b>	Chemistry Laboratory (0+0+6 = 4)	<b>PL-401</b>	Physics Laboratory (0+0+6 = 4)	<b>B-403</b>	Biostatistics (3+1+0 = 4)	<b>M-405</b>	Complex Analysis (3+2+0 = 5)
<b>H-401</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-401</b>	Humanities and Social Science (3+0+0 = 3)	<b>BL-401</b>	Biology Laboratory (0+0+6 = 4)		
<b>PL-402</b>	Computational Laboratory (0+1+3 = 3)	<b>PL-403</b>	Statistical and Computational Techniques (0+1+3 = 3)	<b>PL-402</b>	Computational Laboratory (0+1+3 = 3)	<b>PL-403</b>	Statistical and Computational Techniques (0+1+3 = 3)
<b>Credits</b>	<b>26 (95)</b>		<b>26 (95)</b>		<b>27 (96)</b>		<b>28 (101)</b>

**THIRD YEAR**  
**SEMESTER –V (August to November)**  
**Total credits for semester-V = 25 -26**

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> (Contact Hrs: L + T + P = Credits)		<b>BIOLOGY</b> (Contact Hrs: L + T + P = Credits)		<b>MATHEMATICS</b> (Contact Hrs: L + T + P = Credits)	
<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>
<b>C-501</b>	Analytical Chemistry (3+1+0 = 4)	<b>P-501</b>	Electromagnetism-II (3+1+0 = 4)	<b>C-501</b>	Analytical Chemistry (3+1+0 = 4)	<b>M-501</b>	Analysis-III (Measure and Integration) (3+2+0 = 5)
<b>C-502</b>	Quantum Chemistry -II (3+1+0 = 4)	<b>P-502</b>	Quantum Mechanics-II (3+1+0 = 4)	<b>B-501</b>	Genetics (3+1+0 = 4)	<b>M-502</b>	Algebra-III (Field Theory) (3+2+0 = 5)
<b>C-503</b>	Inorganic Chemistry-II (3+1+0 = 4)	<b>P-503</b>	Statistical Physics-I (3+1+0 = 4)	<b>B-502</b>	Cell Biology-II (3+1+0 = 4)	<b>M-503</b>	Topology-II (3+2+0 = 5)
<b>C-504</b>	Spectroscopy-II (3+1+0 = 4)	<b>PL-501</b>	Physics Laboratory (0+0+6 = 4)	<b>B-503</b>	Biodiversity (3+1+0 = 4)	<b>M-504</b>	Graph Theory (3+2+0 = 5)
<b>CL-501</b>	Chemistry Laboratory (0+0+6 = 4)	<b>PL-502</b>	Numerical Methods Laboratory (0+2+3 = 4)	<b>BL-501</b>	Biology Laboratory (0+0+6 = 4)	<b>PL-502</b>	Numerical Methods Laboratory (0+2+3 = 4)
<b>H-501</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-501</b>	Humanities and Social Science (3+0+0 = 3)	<b>H-501</b>	Humanities and Social Science (3+0+0 = 3)		
<b>G-501</b>	Environmental Science (2+0+0 = 2)	<b>G-501</b>	Environmental Science (2+0+0 = 2)	<b>G-501</b>	Environmental Science (2+0+0 = 2)	<b>G-501</b>	Environmental Science (2+0+0 = 2)
<b>Credits</b>	<b>25 (120)</b>		<b>25 (120)</b>		<b>25 (121)</b>		<b>26 (127)</b>

## SEMESTER –VI (January -April)

**Total credits for semester-VI = 23-27**

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> (Contact Hrs: L + T + P = Credits)		<b>BIOLOGY</b> (Contact Hrs: L + T + P = Credits)		<b>MATHEMATICS</b> (Contact Hrs: L + T + P = Credits)	
Code	Subject	Code	Subject	Code	Subject	Code	Subject
<b>C-601</b>	Biophysical Chemistry (3+1+0 = 4)	<b>P-601</b>	Nuclear Physics (3+1+0 = 4)	<b>C-601</b>	Biophysical Chemistry (3+1+0 = 4)	<b>M-601</b>	Analysis-IV (Fourier Analysis) (3+2+0 = 5)
<b>C-602</b>	Group Theory & Applications (3+1+0 = 4)	<b>P-602</b>	Condensed Matter Physics-I (3+1+0 = 4)	<b>B-601</b>	Immunology-I (3+1+0 = 4)	<b>M-602</b>	Algebra-IV (Module Theory) (3+2+0 = 5)
<b>C-603</b>	Inorganic Chemistry-III (3+1+0 = 4)	<b>P-603</b>	Atomic & Molecular Physics (3+1+0 = 4)	<b>B-602</b>	Animal Physiology (3+1+0 = 4)	<b>M-603</b>	Differential equations and Special Functions (4+2+0 = 6)
<b>C-604</b>	Organic Chemistry-III (3+1+0 = 4)	<b>P-604</b>	Mathematical Physics - III (3+1+0 = 4)	<b>B-603</b>	Plant Physiology (3+1+0 = 4)	<b>M-604</b>	Probability Theory (3+2+0 = 5)
<b>C-605</b>	Nuclear Chemistry (3+1+0 = 4)			<b>B-604</b>	Microbiology (3+1+0 = 4)		
<b>H-601</b>	Humanities and Social Sciences (3+0+0 = 3)	<b>H-601</b>	Humanities and Social Sciences (3+0+0 = 3)	<b>H-601</b>	Humanities and Social Sciences (3+0+0 = 3)	<b>H-601</b>	Humanities and Social Sciences (3+0+0 = 3)
<b>CL-601</b>	Chemistry Laboratory (0+0+6 = 4)	<b>PL-601</b>	Physics Laboratory (0+0+6 = 4)	<b>BL-601</b>	Biology Laboratory (0+0+6 = 4)		
<b>Credits</b>	<b>27 (147)</b>		<b>23 (143)</b>		<b>27 (148)</b>		<b>24 (151)</b>

**Fourth YEAR**  
**SEMESTER –VII (August to November)**  
**Total credits for semester-VII = 24 - 26**

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> (Contact Hrs: L + T + P = Credits)		<b>BIOLOGY</b> (Contact Hrs: L + T + P = Credits)		<b>MATHEMATICS</b> (Contact Hrs: L + T + P = Credits)	
<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>
<b>C-701</b>	Photochemistry (3+1+0 = 4)	<b>P-701</b>	Fluid Mechanics (3+1+0 = 4)	<b>B-701</b>	Biotechnology-I (3+1+0 = 4)	<b>M-701</b>	Functional Analysis (3+2+0 = 5)
<b>C-702</b>	Molecular Thermodynamics (3+1+0 = 4)	<b>P-702</b>	Statistical Physics-II (3+1+0 = 4)	<b>B-702</b>	Immunology –II (3+1+0 = 4)	<b>M-702</b>	Commutative Algebra (3+2+0 = 5)
<b>C-703</b>	Organometallics & Bioinorganic Chemistry (3+1+0 = 4)	<b>P-703</b>	Condensed Matter Physics-II (3+1+0 = 4)	<b>B-703</b>	Developmental Biology (3+1+0 = 4)	<b>M-703</b>	Algebraic Topology (3+2+0 = 5)
<b>C-704</b>	Physical Organic Chemistry (3+1+0 = 4)		Elective-II (3+1+0 = 4)	<b>B-704</b>	Imaging Technology in Biological Research (3+1+0 = 4)	<b>M-704</b>	Differential Geometry and Applications (3+2+0 = 5)
<b>CL-701</b>	Advanced Chemistry Laboratory (0+2+6= 6)	<b>PL-701</b>	Advanced Physics Laboratory (0+2+6= 6)	<b>BL-701</b>	Advanced Biology Laboratory (0+2+6= 6)		
<b>CPr-701</b>	Project (4)	<b>PPr-701</b>	Project (4)	<b>BPr-701</b>	Project (4)	<b>MPr-701</b>	Project (4)
<b>Credits</b>	<b>26 (173)</b>		<b>26 (169)</b>		<b>26 (174)</b>		<b>24 (175)</b>

## SEMESTER –VIII (January to April)

**Total credits for semester-VIII = 26-28**

<b>CHEMISTRY</b> (Contact Hrs: L + T + P = Credits)		<b>PHYSICS</b> (Contact Hrs: L + T + P = Credits)		<b>BIOLOGY</b> (Contact Hrs: L + T + P = Credits)		<b>MATHEMATICS</b> (Contact Hrs: L + T + P = Credits)	
Code	Subject	Code	Subject	Code	Subject	Code	Subject
<b>C-801</b>	Materials Chemistry (3+1+0 = 4)	<b>P-801</b>	Astronomy & Astrophysics (3+1+0 = 4)	<b>B-801</b>	Virology (3+1+0 = 4)	<b>M-801</b>	Partial Differential Equations (3+2+0 = 5)
<b>C-802</b>	Macro- & Supra-Molecular Chemistry (3+1+0 = 4)	<b>P-802</b>	Nonlinear Dynamics & Chaos (3+1+0 = 4)	<b>B-802</b>	Neuro Biology (3+1+0 = 4)	<b>M-802</b>	Algebraic Number Theory (3+2+0 = 5)
<b>C-803</b>	Computational Chemistry (3+1+0 = 4)	<b>P-803</b>	Computational Physics (3+1+0 = 4)	<b>B-803</b>	Bioinformatics (3+1+0 = 4)	<b>M-803</b>	Differential Topology (3+2+0 = 5)
<b>C-804 / C-805</b>	Lasers and its Applications / NMR in Chemistry (3+1+0 = 4)		Elective-III (3+1+0 = 4)	<b>B-804</b>	Biotechnology-II (3+1+0 = 4)	<b>M-804</b>	Computational Mathematics (3+2+0 = 5)
<b>CL-801</b>	Advanced Chemistry Laboratory (0+2+6 = 6)	<b>PL-801</b>	Advanced Physics Laboratory (0+2+6 = 6)	<b>BL-801</b>	Advanced Biology Laboratory (0+2+6 = 6)		
<b>CPr-801</b>	Project (6)	<b>PPr-801</b>	Project (6)	<b>BPr-801</b>	Project (6)	<b>MPr-801</b>	Project (6)
<b>Credits</b>	<b>28 (201)</b>		<b>28 (197)</b>		<b>28 (202)</b>		<b>26 (201)</b>



**FIFTH YEAR**  
**SEMESTER-IX (August to November)**  
**Total credits for semester-IX = 25**

CHEMISTRY		PHYSICS		BIOLOGY		MATHEMATICS	
Code	Subject	Code	Subject	Code	Subject	Code	Subject
<b>CPr-901</b>	Project	<b>PPr-901</b>	Project	<b>BPr-901</b>	Project	<b>MPr-901</b>	Project
<b>Credits</b>	<b>25 (226)</b>		<b>25 (222)</b>		<b>25 (227)</b>		<b>25 (226)</b>

**SEMESTER-X (January to April)**  
**Total credits for semester-X = 16 - 21**

CHEMISTRY (Contact Hrs: L + T + P = Credits)		PHYSICS (Contact Hrs: L + T + P = Credits)		BIOLOGY (Contact Hrs: L + T + P = Credits)		MATHEMATICS (Contact Hrs: L + T + P = Credits)	
Code	Subject	Code	Subject	Code	Subject	Code	Subject
	Elective-I (3+1+0 = 4)		Elective-IV (3+1+0 = 4)		Elective-I (3+1+0 = 4)		Elective I (3+2+0 = 5)
	Elective-II (3+1+0 = 4)		Elective-V (3+1+0 = 4)		Elective-II (3+1+0 = 4)		Elective II (3+2+0 = 5)
	Elective -III (3+1+0 = 4)		Elective-VI (3+1+0 = 4)		Elective -III (3+1+0 = 4)		Elective III (3+2+0 = 5)
					Elective -IV (3+1+0 = 4)		
<b>CPr-1001</b>	Project (6)	<b>PPr-1001</b>	Project (6)	<b>BPr-1001</b>	-	<b>MPr-1001</b>	Project (6)
<b>Credits</b>	<b>3 electives and 1 project (12+ 6 = 18 credits) (Total Credits: 244)</b>		<b>3 electives and 1 project (12+6=18 credits) (Total Credits: 240)</b>		<b>4 electives (16 credits) (Total Credits: 243)</b>		<b>3 electives and 1 project (15+ 6 = 21 credits) (Total Credits: 247)</b>