

Pre-Revision

Study & Evaluation Scheme

of

Master of Science (Chemistry)

[Applicable for Academic Session 2018-19]

[Approved by Hon'ble VC dated August 08, 2017, August 14, 2018, January 23, 2019 & November 29, 2019]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in



Study & Evaluation Scheme

Semester I

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCH111	Inorganic Chemistry-I	4	-	-	4	40	60	100
2	MCH112	Organic Chemistry-I	4	-	-	4	40	60	100
3	MCH113	Physical Chemistry-I	4	-	-	4	40	60	100
4	MAT115	Research Methodology	3	1	-	4	40	60	100
5	MCH161	Inorganic Chemistry-I (Lab)	-	-	4	2	50	50	100
6	MCH162	Physical Chemistry-I (Lab)	-	-	4	2	50	50	100
7	MOOC11	MOOC Program-I (Optional)	-	-	-	1/2	-	100	100
8	MSC111	Discipline & General Proficiency	-	-	-	-	100	-	100
Total			15	1	8	20	360	340	800

Semester-II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCH211	Inorganic Chemistry-II	4	-	-	4	40	60	100
2	MCH212	Organic Chemistry-II	4	-	-	4	40	60	100
3	MCH213	Physical Chemistry-II	4	-	-	4	40	60	100
4	MCH214	Spectroscopy-I	4	-	-	4	40	60	100
5	MCH261	Organic Chemistry-I (Lab)	-	-	4	2	50	50	100
6	MCH262	Inorganic Chemistry-II (Lab)	-	-	4	2	50	50	100
7	MOOC12	MOOC Program-II (Mandatory)	-	-	-	1/2	-	100	100
8	MSC211	Discipline & General Proficiency	-	-	-	-	100	-	100
Total			16	0	8	21/22	360	440	800



Semester III

S. N o.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCH311	Spectroscopy-II	4	-	-	4	40	60	100
2	Departmental Elective-I								
	MCH 312	Polymer Chemistry	4	-	-	4	40	60	100
	MCH313	Chemistry of Nano-materials							
	MCH314	Chemistry of Natural Products							
3	Departmental Elective-II								
	MCH315	Organometallic Chemistry	4	-	-	4	40	60	100
	MCH316	Medicinal Chemistry							
	MCH317	Quantum Chemistry and Solid-State Chemistry							
4	Open Elective								
	MSC011	Industrial Safety & Health Hazards	4	-	-	4	40	60	100
	MSC012	Elementary Biophysics							
	MSC013	Statistical Techniques in Data Mining							
	MSC014/ ECS411/ 511/611	Database Management System							
5	MCH361	Organic Chemistry-II (Lab)	-	-	4	2	50	50	100
6	MCH362	Physical Chemistry-II (Lab)	-	-	4	2	50	50	100
7	MOOC13	MOOC Program-III (Mandatory)	-	-	-	1/2	-	100	100
8	MSC311	Discipline & General Proficiency	-	-	-	1	100	-	100
	Total		16	0	8	22/23	360	440	800



Semester IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCH411	Biochemistry	4	-	-	4	40	60	100
2	MCH412	Photochemistry & disconnection approach	4	-	-	4	40	60	100
3	Departmental Elective-III								
	MCH417	Heterocyclic Chemistry	4	-	-	4	40	60	100
	MCH413	Bio-Inorganic Chemistry							
	MCH414	Bio-Organic Chemistry							
	MCH415	Bio-Physical Chemistry							
4	MCH416	Environmental Chemistry	4	-	-	4	40	60	100
5	MCH 461	Environmental Chemistry Lab	-	-	4	2	50	50	100
6	MCH492	Project, Seminar & Viva	-	-	12	6	50	50	100
7	MSC411	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			16	0	16	25	360	340	700




Post Revision

Study & Evaluation Scheme

of

Master of Science (Chemistry)

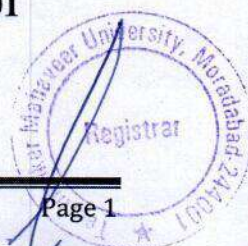
[Applicable for Academic Session 2019-20]



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Study & Evaluation Scheme Semester I

S. No.		Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	MCH111	Inorganic Chemistry-I	4	-	-	4	40	60	100
2	CC	MCH112	Organic Chemistry-I	4	-	-	4	40	60	100
3	CC	MCH113	Physical Chemistry-I	4	-	-	4	40	60	100
4	AEC	MAT115	Research Methodology	3	1	-	4	40	60	100
5	CC	MCH161	Inorganic Chemistry-I (Lab)	-	-	4	2	50	50	100
6	CC	MCH162	Physical Chemistry-I (Lab)	-	-	4	2	50	50	100
Total				15	1	8	20	260	340	600

Value Added Course: It is an audit course. The performance of the student in this course will not be counted in the overall result however the student has to pass it compulsorily with 45% marks.

1	VAC-I	TMUPA-101	Elementary Arithmetic & Analytical Reasoning	2	1	-	-	40	60	100
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MOOC Course:

1	MOOC	MOOC11	MOOC Program-I (Optional)	-	-	-	2	-	100	100
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Semester-II

S. No.		Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	MCH211	Inorganic Chemistry-II	4	-	-	4	40	60	100
2	CC	MCH212	Organic Chemistry-II	4	-	-	4	40	60	100
3	CC	MCH213	Physical Chemistry-II	4	-	-	4	40	60	100
4	CC	MCH214	Spectroscopy-I	4	-	-	4	40	60	100
5	CC	MCH261	Organic Chemistry-II (Lab)	-	-	4	2	50	50	100
6	CC	MCH262	Inorganic Chemistry-II (Lab)	-	-	4	2	50	50	100
Total				16	-	8	20	260	340	600

*Value Added Course:

1	VAC-2	TMUPA-201	Progressive Algebra & Data Management	2	1	-	-	40	60	100
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MOOC Course:

1	MOOC-1	MOOC12	MOOC Program –I (Optional)	-	-	-	2	-	100	100
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M.Sc. (Chemistry)-Semester III

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	MCH311	Spectroscopy-II	4	-	-	4	40	60	100
2	AECC	MSC011	Industrial Safety & Health Hazards	4	-	-	4	40	60	100
3	DSE		Discipline Specific Elective Courses	4	-	-	4	40	60	100
4	DSE			4	-	-	4	40	60	100
5	LC	MCH361	Organic Chemistry II (Lab)	-	-	4	2	50	50	100
6	LC	MCH362	Physical Chemistry II (Lab)	-	-	4	2	50	50	100
7	PROJ	MCH392	Industrial Training & Presentation	-	-	-	5	50	50	100
8	DGP	MGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	16	-	8	25	310	390	700

MOOC Course:

1	MOOC-2	MOOC13	MOOC Program –II (Optional)	-	-	-	2	-	100	100
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M.Sc. (Chemistry)-Semester IV

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	MCH411	Bio-Chemistry	4	-	-	4	40	60	100
2	CC	MCH412	Photochemistry & Disconnection approach	4	-	-	4	40	60	100
3	CC	MCH416	Environmental Chemistry	4	-	-	4	40	60	100
4	AECC	MHM420	Entrepreneurship	4	-	-	4	40	60	100
5	DSE		Discipline Specific Elective Course-III	4	-	-	4	40	60	100
6	LC	MCH461	Environmental Chemistry (Lab)	-	-	4	2	50	50	100
7	PROJ	MCH492	Project	-	-	16	8	50	50	100
8	DGP	MGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	20	-	20	30	300	400	700

ELECTIVE COURSES OFFERED

S.No	Code	Course	L	T	P	Credit
Semester III-Discipline Specific Elective Course-I -(Any one)						
1	MCH312	Polymer Chemistry	4	-	-	4
2	MCH313	Chemistry of Nano-materials	4	-	-	4
3	MCH314	Chemistry of Natural Products	4	-	-	4
Semester III-Discipline Specific Elective Course-II -(Any one)						
4	MCH315	Organometallic Chemistry	4	-	-	4
5	MCH316	Medicinal Chemistry	4	-	-	4
6	MCH317	Quantum Chemistry & Solid State Chemistry	4	-	-	4
Semester IV-Discipline Specific Elective Course-III -(Any one)						
7	MCH413	Bio-Inorganic Chemistry	4	-	-	4
8	MCH414	Bio-Organic Chemistry	4	-	-	4
9	MCH415	Bio-Physical chemistry	4	-	-	4
10	MCH417	Heterocyclic Chemistry	4	-	-	4

New Course Added

Course Code: MCH165	M.Sc. Chemistry (Semester-I) Computer Skills for Chemist (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Describe the usage of computers and why computers are essential components in business and society.	
CO2.	Utilize the Internet Web resources and evaluate on-line e-business system	
CO3.	Solve common business problems using appropriate Information Technology applications and systems.	
CO4.	Identify categories of programs, system software and applications. Organize and work with files and folders.	
CO5.	Describe various types of networks network standards and communication software.	
Course Content:		

Module 1:

Introduction to computers hardware and software components; Operating System; Usage of Internet and Intranet; protocols and their importance; networking; Internet Browsing: Net Surfing, Search Engine, Email.

Module 2:

Introduction to MS office: Word, Power point, Excel, Short cut Keys, Mail Merge, Watermarking, Animation in presentation.

**Module 1 & 2 are prerequisite for experiment hence needs to be explained before commencement of experiments.*

LIST OF EXPERIMENTS:

1. Fundamentals of computer system, with its functional components.
2. Create a formatted WORD document.
3. Create a WORD document using different fonts.
4. Create a table & perform operations in it.
5. Create a WORD document, using the functions page set up, & page preview, and then print that document.
6. Implement Mail Merge.
7. Collect the information of any company & perform the below operation in it:
 - (a) Insert the data into Row/Column of Excel, worksheet
 - (b) Create a worksheet in Excel, perform alignment, text wrapping & sort the data.
8. Collect the information of any company & perform the below operation in it:
 - (a) Generate the graph in Excel.
 - (b) Create a Hyperlink to a word document.
 - (c) Create a worksheet using the functions- page set up, print preview & then print the worksheet.
9. Create, save & print the power point presentation
10. Create a power point presentation using clipart, Word art gallery & then add transition & Animation effects.



New Course Added

Course Code: TMUPA-101	VAC (Value Added Course) M.Sc. Chemistry (Semester-I) Elementary Arithmetic & Analytical reasoning	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Operationalizing the inter-related concept of Percentage in Profit Loss and Discount.	
CO2.	Applying the arithmetical concepts in Ratio and Proportion, Mixture and Allegation.	
CO3.	Employing the techniques of Percentage, Ratios and Average in inter related concepts of Time and Work, Time speed and Distance.	
CO4.	Evaluating the different possibilities of various reasoning based problems in series, Direction and Coding-Decoding.	
Course Content:		
Unit-1:	Percentages Basic calculation, ratio equivalent, base, change of base, multiplying factor, percentage change, increment, decrement, successive percentages, word problems	4 Hours
Unit-2:	Profit Loss Discount Basic definition, formula, concept of mark up, discount, relation with successive change, faulty weights	3 Hours
Unit-3:	Ratio, proportions and variations Concept of ratios, proportions, variations, properties and their applications	3 Hours
Unit-4:	Mixtures and allegations Mixtures of 2 components, mixtures of 3 components, Replacements	4 Hours
Unit-5:	Time and Work Same efficiency, different efficiency, alternate work, application in Pipes and Cisterns	4 Hours
Unit-6:	Time Speed Distance Average speed, proportionalities in Time, Distance, trains, boats, races, circular tracks	6 Hours
Unit-7:	Number and Alphabet Series Different kind of series and pattern	2 Hours
Unit-8:	Direction sense Simple statements, shadow type	2 Hours
Unit-9:	Coding and decoding Sequential coding, reverse coding, abstract coding	2 Hours
Reference Books:	<ul style="list-style-type: none"> R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com R6:-Logical Reasoning by Nishith K Sinha 	



New Course Added

Course Code: TMUPS-101	Value Added Course M.Sc. Chemistry- Semester-I Managing Self	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Utilizing effective verbal and non-verbal communication techniques in formal and informal settings	
CO2.	Understanding and analyzing self and devising a strategy for self growth and development.	
CO3.	Adapting a positive mindset conducive for growth through optimism and constructive thinking.	
CO4.	Utilizing time in the most effective manner and avoiding procrastination.	
CO5.	Making appropriate and responsible decisions through various techniques like SWOT, Simulation and Decision Tree.	
CO6.	Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.	
Course Content:		
Unit-1:	Personal Development: Personal growth and improvement in personality Perception Positive attitude Values and Morals High self motivation and confidence Grooming	10 Hours
Unit-2:	Professional Development: Goal setting and action planning Effective and assertive communication Decision making Time management Presentation Skills Happiness, risk taking and facing unknown	8 Hours
Unit-3:	Career Development: Resume Building Occupational Research Group discussion (GD) and Personal Interviews	12 Hours
Reference Books:	<ol style="list-style-type: none"> 1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education 2. Tracy, Brian, Time Management (2018), Manjul Publishing House 3. Hill, Napoleon, Think and grow rich (2014), Amazing Reads 4. Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub 5. https://www.hloom.com/resumes/creative-templates/ 6. https://www.mbauniverse.com/group-discussion/topic.php 7. Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan 8. Burne, Eric, Games People Play (2010), Penguin UK 9. https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression <p>* Latest editions of all the suggested books are recommended.</p>	

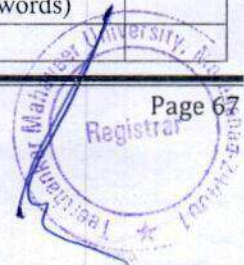


Course Code: TMUPA-201	VAC (Value Added Course) M.Sc. Chemistry (Semester-II) Progressive Algebra & Data Management	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the concepts of modern mathematics Divisibility rule, Remainder Theorem, HCF /LCM in Number System.	
CO2.	Relating the rules of permutation and combination, Fundamental Principle of Counting to find the probability.	
CO3.	Applying calculative and arithmetical concepts of ratio, Average and Percentage to analyze and interpret data	
CO4.	Employing the concept of higher level reasoning in Clocks and Calendars, Set theory and Puzzle Problems.	
Course Content:		
Unit-1:	Number theory Classification of Numbers, Divisibility Rules, HCF and LCM, Factors, Cyclicity (Unit Digit and Last Two digit), Remainder Theorem, Highest Power of a Number in a Factorial, Number of trailing zeroes	7 Hours
Unit-2:	Data interpretation Data Interpretation Basics, Bar Chart, Line Chart, Tabular Chart, Pie Chart, DI tables with missing values	4 Hours
Unit-3:	Permutations and combinations Fundamental counting, and or, arrangements of digits, letters, people in row, identical objects, rank, geometrical arrangements, combination: - basic, handshakes, committee, selection of any number of objects, identical and distinct, grouping and distribution, de-arrangements	4 Hours
Unit-4:	Probability Introduction, Probability based on Dice and Coins, Conditional Probability, Bayes Theorem	3 Hours
Unit-5:	Set theory Introduction , Venn Diagrams basics, Venn Diagram – 3 sets, 4-Group Venn Diagrams	3 Hours
Unit-6:	Problem Solving Introduction, Puzzle based on 3 variable, Puzzle based on 4 variable	5 Hours
Unit-7:	Clocks and calendars Introduction , Angle between hands , Gain and loss of Clock, Interchange of hands, Introduction of Calendars, Leap Year , Ordinary Year, Company Specific Pattern	4 Hours
Reference Books:	<ul style="list-style-type: none"> R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com 	



Course Code: TMUPS-201	VAC (Value Added Course) M.Sc. Chemistry (Semester-II) Managing Work and Others	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Communicating effectively in a variety of public and interpersonal settings.	
CO2.	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.	
CO3.	Analyzing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.	
CO4.	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.	
CO5.	Handling difficult situations with grace, style, and professionalism.	
Course Content:		
Unit-1:	Intrapersonal Skills: Creativity and Innovation Understanding self and others (Johari window) Stress Management Managing Change for competitive success Handling feedback and criticism	8 Hours
Unit-2:	Interpersonal Skills: Conflict management Development of cordial interpersonal relations at all levels Negotiation Importance of working in teams in modern organisations Manners, etiquette and net etiquette	12 Hours
Unit-3:	Interview Techniques: Job Seeking Group discussion (GD) Personal Interview	10 Hours
Reference Books:	<ol style="list-style-type: none"> Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education Burne, Eric, Games People Play (2010), Penguin UK Carnegie, Dale, How to win friends and influence people (2004), RHUK Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan Steinburg, Scott, Nettiquette Essentials (2013), Lulu.com 	

Course Code: MCH392	M.Sc. Chemistry- Semester-III Industrial Training & Presentation	L-0 T-0 P-0 C-5
Course Procedure:	<p>Students will have to undergo industrial training of six weeks in any industry or reputed organization after the II semester examination in summer. The evaluation of this training shall be included in the III semester evaluation.</p> <p>The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the II semester and shall be the nodal officer for coordination of the training.</p> <p>Students will prepare an exhaustive technical report of the training during the III semester which will be duly signed by the officer under whom training was undertaken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director/Principal of the college.</p> <p>The student at the end of the III semester will present his report about the training before a committee constituted by the Director/Principal of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director/Principal.</p> <p>The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.</p> <p>Not more than three students would form a group for such industrial training/ project submission.</p>	
	The marking shall be as follows.	
Internal:	By the Faculty Guide – 25 marks.	
50 marks	By Committee appointed by the Director/Principal – 25 marks.	
External:	By Officer-in-charge trainee in industry – 25 marks.	
50 marks	By External examiner appointed by the University – 25 marks	
	Technical report will consist five chapter as per given format:	
Chapter 1:	Brief about organization	
Chapter 2:	Detail of business carried out by organization	
Chapter 3:	Specific contribution during the industrial training (not more than 500 words)	
Chapter 4:	Learning during the industrial training (not more than 200 words)	
Chapter 5:	Conclusion	



Course Code: MHM420	M.Sc. Chemistry- Semester-IV Entrepreneurship	L-4 T-0 P-0 C-4
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Understanding the concepts and skills needed to run a business successfully.	
CO2.	Applying the steps of project formulation and market research.	
CO3.	Analyzing the techno economic feasibility of a project.	
CO4.	Analyzing various growth strategies in small scale industry.	
CO5.	Evaluating breakeven point, working capital requirements, and taxes.	
Course Content:		
Unit-1:	Entrepreneurship: Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.	8 Hours
Unit-2:	Motivation: Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	8 Hours
Unit-3:	Business: Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	8 Hours
Unit-4:	Financing and Accounting: Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	8 Hours
Unit-5:	Support to Entrepreneurs: Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	8 Hours
Text Book:	1. Khanka. S.S., "Entrepreneurial Development" S. Chand & Co. Ltd., Ram Nagar, New Delhi.	
Reference Books:	1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill.	

