

# Study & Evaluation Scheme

of

## Master of Science (Mathematics)

[Applicable for Academic Session 2019-20]



**TEERTHANKER MAHAVEER UNIVERSITY**

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**TEERTHANKER MAHAVEER UNIVERSITY**  
(Established under Govt. of U.P. Act No. 30, 2008)  
Delhi Road, Bagarpur, Moradabad (U.P.)

**Study & Evaluation Scheme**

**SUMMARY**

|  |                                     |
|--|-------------------------------------|
| <b>Institute Name</b>                      | Faculty of Engineering              |
| <b>Programme</b>                           | M.Sc. Mathematics                   |
| <b>Duration</b>                            | Two Years full time(Four Semesters) |
| <b>Medium</b>                              | English                             |
| <b>Minimum Required Attendance</b>         | 75%                                 |
| <b><u>Credits</u></b>                      |                                     |
| <b>Maximum Credits</b>                     | 96                                  |
| <b>Minimum Credits Required for Degree</b> | 91                                  |

**Assessment:**

| Evaluation   |              |              | Internal      | External                   | Total |
|--|--------------|--------------|---------------|----------------------------|-------|
| Theory   |              |              | 40            | 60                         | 100   |
| Practical/ Dissertations/ Project Reports/ Viva-Voce |              |              | 50            | 50                         | 100   |
| Class Test-1   | Class Test-2 | Class Test-3 | Assignment(s) | Attendance & Participation | Total |
| Best two out of three                                |              |              |               |                            |       |
| 10   | 10           | 10           | 10            | 10                         | 40    |
| Duration of Examination                              |              |              | External      | Internal                   |       |
|  |              |              | 3 Hours       | 1.5 Hours                  |       |

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external). A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

# Provision for delivery of 25% content through online mode.

# Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

# Maximum no of years required to complete the program: N+2 (N=No of years for program)

**Question Paper Structure**

- The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.
- Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.
- The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.

**IMPORTANT NOTES:**

- The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).
- Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.
- There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.





## Program Structure-M.Sc. Mathematics

### A. Introduction:

M.Sc. Mathematics is a two-year post-graduate programme designed to extend students knowledge and refine their abilities to solve complex problems accurately. M.Sc. Mathematics introduces students to a wide choice of modules in interesting areas such as Abstract Algebra, Real Analysis, Complex Analysis, Topology, Operation research, graph theory & number theory etc. This programme also gives an opportunity for students to conduct independent researches in pure to applied mathematics. Besides the programme, focuses on propelling students' numeracy skills and the ability to use mathematical concepts to the model the solution to mathematical problems. The programme also enables the students to develop the ability to consolidate and communicate mathematics logically and briefly in a variety of forms. Students who want to pursue higher education in the field of Mathematics can opt for PhD in the same discipline.

### B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the M.Sc. program:

- **Core competency:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. We are offered core course in all semesters like operation research, Differential Equation, Real Analysis, Topology, Number Theory etc with the 4 & 5 credit of each.
- **Program/Discipline Specific Elective Course (DSEC):** A Post graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental/applied mathematics knowledge in various fields of interest like Statistics Software & Tools, Numerical Techniques & its lab etc.
- **Skilled communicator:** The course curriculum incorporates basics and advanced training in order to make a post graduate student capable of expressing the subject through technical writing as well as through oral presentation.
- **Critical thinker and problem solver:** The course curriculum also includes components that can be helpful to post graduate students to develop critical thinking ability by way of solving problems/numerical using basic & advance knowledge and concepts of mathematics.
- **Sense of inquiry:** It is expected that the course curriculum will develop an inquisitive characteristics among the students through appropriate questions, planning and reporting experimental investigation.
- **Skilled project manager:** The course curriculum has been designed in such a manner as to enabling a post graduate student to become a skilled project manager by acquiring knowledge about mathematical project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.
- **Ethical awareness/reasoning:** A post graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.



- **Lifelong learner:** The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.
- **Value Added Course (VAC):** A Value Added Course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be Two courses of Aptitude in Semester I, II semesters and two courses of Soft Skills in I & II Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.
- **Skill Enhancement Course:** This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. We offer one SECs course as Lab in IV Semester with 2 credits.

### C. Programme Specific Outcomes (PSOs)

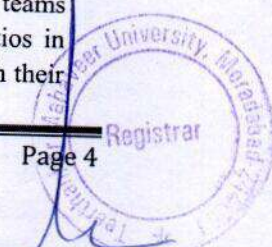
The learning and abilities or skills that a student would have developed by the end of three-years M.Sc Mathematics:

|         |   |
|---------|---|
| PSO – 1 | Understanding the skills set required in industries, laboratories, Banks, Insurance Companies, Educational/Research institutions, Administrative positions.                 |
| PSO – 2 | Applying the knowledge for Professional Growth: Keep on discovering new avenues in the chosen field and exploring areas that remain conducive for research and development. |
| PSO – 3 | Applying Skills like time management, crisis management, stress interviews and working as a team for successful career.   |
| PSO – 4 | Analyzing the problems by using problem solving skills and apply them independently to problems in pure and applied mathematics.  |
| PSO – 5 | Evaluating quantitative models arising in social science, business and other contexts.  |
| PSO – 6 | Creating and applying appropriate techniques, resources and modern technology in multidisciplinary environment.   |

### D. Pedagogy & Unique practices adopted:

“Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept”. In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning:**

- **Role Play & Simulation:** Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their





## Study and Evaluation Scheme Semester I

| S. No. |      | Course Code | Course                                     | Periods   |          |          | Credit    | Evaluation Scheme |            |            |
|--------|------|-------------|--|-----------|----------|----------|-----------|-------------------|------------|------------|
|        |      |             |  | L         | T        | P        |           | Internal          | External   | Total      |
| 1      | CC   | MAT111      | Differential Equation                      | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 2      | CC   | MAT112      | Real Analysis                              | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 3      | CC   | MAT113      | Linear Algebra                             | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 4      | SEC  | MAT115      | Research Methodology                       | 3         | 1        | -        | 4         | 40                | 60         | 100        |
| 5      | AECC | MAT116      | Computer System & Programming in C++       | 3         | -        | -        | 3         | 40                | 60         | 100        |
| 6      | AEC  | MAT161      | Computer System & Programming in C++ (Lab) | -         | -        | 2        | 1         | 50                | 50         | 100        |
|        |      |             | <b>Total</b>                               | <b>18</b> | <b>1</b> | <b>2</b> | <b>20</b> | <b>250</b>        | <b>350</b> | <b>600</b> |

**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-1 | TMUPA-101 | Elementary Arithmetic & Analytical Reasoning | 2 | 1 | - | - | 40 | 60 | 100 |
|---|-------|-----------|--|---|---|---|---|----|----|-----|

### MOOC Course:

|   |      |        |                           |   |   |   |   |   |     |     |
|---|------|--------|---------------------------|---|---|---|---|---|-----|-----|
| 1 | MOOC | MOOC11 | MOOC Program-I (Optional) | - | - | - | 2 | - | 100 | 100 |
|---|------|--------|---------------------------|---|---|---|---|---|-----|-----|






## Semester II

| S. No. |     | Course Code | Course                     | Periods   |          |          | Credit    | Evaluation Scheme |            |            |
|--------|-----|-------------|----------------------------|-----------|----------|----------|-----------|-------------------|------------|------------|
|        |     |             |                            | L         | T        | P        |           | Internal          | External   | Total      |
| 1      | CC  | MAT211      | Complex Analysis           | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 2      | CC  | MAT212      | Advance Abstract Algebra   | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 3      | CC  | MAT213      | Numerical Techniques       | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 4      | CC  | MAT214      | Topology                   | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 5      | CC  | MAT215      | Operation Research         | 4         | -        | -        | 4         | 40                | 60         | 100        |
| 6      | AEC | MAT261      | Numerical Techniques (Lab) | -         | -        | 2        | 1         | 50                | 50         | 100        |
|        |     |             | <b>Total</b>               | <b>20</b> | <b>0</b> | <b>2</b> | <b>21</b> | <b>250</b>        | <b>350</b> | <b>600</b> |

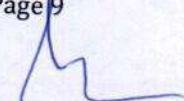
### \*Value Added Course:

|   |       |           |                                       |   |   |   |   |    |    |     |
|---|-------|-----------|---------------------------------------|---|---|---|---|----|----|-----|
| 1 | VAC-2 | TMUPA-201 | Progressive Algebra & Data Management | 2 | 1 | - | - | 40 | 60 | 100 |
|---|-------|-----------|---------------------------------------|---|---|---|---|----|----|-----|

### MOOC Course:

|   |        |        |                            |   |   |   |   |   |     |     |
|---|--------|--------|----------------------------|---|---|---|---|---|-----|-----|
| 1 | MOOC-1 | MOOC12 | MOOC Program –I (Optional) | - | - | - | 2 | - | 100 | 100 |
|---|--------|--------|----------------------------|---|---|---|---|---|-----|-----|







### M.Sc. (Mathematics)-Semester III

| S. No | Category | Course Code | Course                               | Periods   |          |           | Credit    | Evaluation Scheme |            |            |
|-------|----------|-------------|--------------------------------------|-----------|----------|-----------|-----------|-------------------|------------|------------|
|       |          |             |                                      | L         | T        | P         |           | Internal          | External   | Total      |
| 1     | CC       | MAT311      | Functional Analysis                  | 4         | 1        | -         | 5         | 40                | 60         | 100        |
| 2     | CC       | MAT312      | Partial Differential Equations       | 4         | 1        | -         | 5         | 40                | 60         | 100        |
| 3     | AECC     | MHM320      | Human values & Professional Ethics   | 3         | -        | -         | 3         | 40                | 60         | 100        |
| 4     | DSE      |             | Discipline Specific Elective Courses | 4         | 1        | -         | 5         | 40                | 60         | 100        |
| 5     | DSE      |             |                                      |           |          |           |           |                   |            |            |
| 6     | PROJ     | MAT392      | Industrial Training & Presentation   | -         | -        | 12        | 6         | 50                | 50         | 100        |
| 7     | DGP      | MGP311      | Discipline & General Proficiency     | -         | -        | -         | -         | 100               | -          | 100        |
|       |          |             | <b>Total</b>                         | <b>19</b> | <b>4</b> | <b>12</b> | <b>29</b> | <b>250</b>        | <b>350</b> | <b>600</b> |

#### MOOC Course:

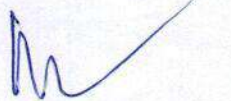
|   |      |        |                             |   |   |   |   |   |     |     |
|---|------|--------|-----------------------------|---|---|---|---|---|-----|-----|
| 1 | MOOC | MOOC13 | MOOC Program –II (Optional) | - | - | - | 2 | - | 100 | 100 |
|---|------|--------|-----------------------------|---|---|---|---|---|-----|-----|






### M.Sc. (Mathematics)-Semester IV

| S. No | Category | Course Code | Course                                  | Periods |   |    | Credit | Evaluation Scheme |          |       |
|-------|----------|-------------|---|---------|---|----|--------|-------------------|----------|-------|
|       |          |             |   | L       | T | P  |        | Internal          | External | Total |
| 1     | CC       | MAT411      | Number Theory                           | 4       | 1 | -  | 5      | 40                | 60       | 100   |
| 2     | CC       | MAT412      | Advance Discrete Mathematics            | 4       | 1 | -  | 5      | 40                | 60       | 100   |
| 3     | DSE      |             | Discipline Specific Elective Course-III | 4       | 1 | -  | 5      | 40                | 60       | 100   |
| 4     | SEC      | MAT461      | MATLAB Programming                      | -       | 1 | 2  | 2      | 50                | 50       | 100   |
| 5     | PROJ     | MAT492      | Project                                 | -       | - | 18 | 9      | 50                | 50       | 100   |
| 6     | DGP      | MGP411      | Discipline & General Proficiency        | -       | - | -  | -      | 100               | -        | 100   |
| Total |          |             |   | 12      | 4 | 20 | 26     | 220               | 280      | 500   |






### ELECTIVE COURSES OFFERED

| S. No  | Code   | Course                                       | L | T | P | Credit |
|--|--------|--|---|---|---|--------|
| <b>Semester III- Discipline Specific Elective Course-I -(Any one)</b>  |        |  |   |   |   |        |
| 1  | MAT314 | Graph Theory                                 | 4 | 1 | 0 | 5      |
| 2  | MSC014 | Database Management System                   | 4 | 1 | 0 | 5      |
| <b>Semester III- Discipline Specific Elective Course-II -(Any one)</b> |        |  |   |   |   |        |
| 3  | MAT315 | Probability & Mathematical Statistics        | 4 | 1 | 0 | 5      |
| 4  | MSC013 | Statistical Techniques in Data Mining        | 4 | 1 | 0 | 5      |
| <b>Semester IV- Discipline Specific Elective Course-III -(Any one)</b> |        |  |   |   |   |        |
| 5  | MAT414 | Fuzzy sets & its application                 | 4 | 1 | 0 | 5      |
| 6  | MAT415 | Calculus of variations and Integral Equation | 4 | 1 | 0 | 5      |



