**University of Management and Technology**

**Department of Education**

**School of Social Sciences and Humanities**

**Course Outline**

|  |  |
| --- | --- |
| Course Code | **ED-446** |
| Course Title | **Teaching of Mathematics** |
| Resource Person(s) |  |
| Semester |  |
| Program | BS Education |
| Credit Hours | 3 |
| Duration | 16 weeks |
| Prerequisites | Nil  |
| Counseling Hours |  |

**Chairperson/Director signature………………………………….**

**Dean’s signature……………………………**

**Date………………………………………….**

**Course Description**

This course is designed specifically to equip prospective science teachers with the latest pedagogical knowledge required to teach the contents of Mathematics at the school level. In addition, the course will also provide the prospective science teachers with an acquaintance with modern assessment techniques and the use of modern equipment and computers in the field of teaching Mathematics**.**

**Learning Outcomes**

After completion of the course, the prospective teachers will be able to:

CLO1. Describe the nature, history, and development of mathematics. C2

CLO2. Appreciate learning by doing rather than instrumental learning A3

CLO3. Revisit beliefs, ideas, and perceptions about teaching and learning mathematics. A4

CLO4. Acquire and demonstrate the skills and competencies required for the teaching of

mathematics. C5

CLO5. Apply the various methods of teaching in mathematics competently by using ICT. C3

CLO6. Construct interactive lesson plans for the teaching of mathematics. C4

**Mapping of CLOs to Program Learning Outcomes (PLOs):**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CLO’s/****PLO’s** | **CLO 1** | **CLO 2** | **CLO 3** | **CLO 4** | **CLO 5** | **CLO 6** |
| **PLO 1: Subject matter knowledge** | **✔** |  |  |  |  |  |
| **PLO 2: Human Growth and Development-** |  | **✔** |  |  |  |  |
| **PLO 3: Knowledge of Professional and Ethical Values** |  |  | **✔** |  |  |  |
| **PLO 4: Instructional Planning and Strategies** |  |  |  | **✔** |  |  |
| **PLO 5: Students’ Assessment-** |  |  |  |  |  |  |
| **PLO 6**: **Learning Environment** |  |  |  |  | **✔** |  |
| **PLO 7: Effective Use of Information and Communication Technologies** |  |  |  |  |  | **✔** |
| **PLO 8: Collaboration and Partnership** |  |  |  |  |  |  |
| **PLO 9: Continuous Professional Development and Code of Conduct-** |  |  |  |  |  |  |

**Teaching Methodology**

The course will be taught using a variety of techniques and including on-campus lectures, discussions, reading assignments, presentations, group work, and research projects. Students will also develop five different lesson plans for Mathematics for different age levels by keeping in view Pakistan’s National Mathematics Curriculum.

**Guideline for Assignments and Presentations:**

* Follow APA 7th Edition style in written assignments.
* Every presenter/pair or group must prepare a presentation summary and distribute it in the class before the presentation.
* Every presenter/pair or group must prepare a backup plan for the presentation in case of electricity or technology failure.
* Meet the deadlines; due to a tight schedule, there are no retakes of presentations.
* Use readable font style, size, slide design, and color schemes for ppt presentations.
* Submit a written report of the presentation before the presentation.
* Each presenter/pair/group will be given 20-30 minutes (but not as a fixed rule, it is a tentative time) for the presentation and 10 minutes for open house question answers.

**Grade Evaluation Criteria**

Following are the criteria for the distribution of marks to evaluate the final grade in a semester. This is a tentative distribution, which may vary as per directions from the competent authority of UMT.

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| --- | --- |
| **Components** | **Marks in Percentage** |
| Class Participation | 5% |
| Attendance | 5% |
| Quizzes | 10% |
| Mid Term | 20% |
| Presentations  | 20% |
| Assignment | 10% |
| Final | 35% |
| Total | 100% |

**Recommended Text Books:**

AIOU (2019). *Teaching of Mathematics*. Allama Iqbal Open University, Islamabad.

**Reference Books:**

Basserear, T. (2012). *Mathematics for Elementary School Teachers:* Belmont, CA: Brooks.

Donovan, S. & Bransford, J. (2005). *How Students Learn: History, Mathematics, and Science in*

*the Classroom* Washington DC: National Academies Press. Also available at

www.nap.edu/catalog.php?record\_id=10126#toc

Haylock, D., & Manning, R. (2014). *Mathematics explained for primary teachers*. Sage.

National Research Council. (2004). *How students learn: History, mathematics, and science in*

*the classroom*. National Academies Press.

Posamentier, A. S., Jaye, D., & Krulik, S. (2007). *Exemplary Practices for Secondary Math*

*Teachers*. Association for Supervision and Curriculum Development. 1703 North Beauregard Street, Alexandria, VA 22311-1714.

Protheroe, N. (2007). What Does Good Math Instruction Look Like?. *Principal*, *87*(1), 51-54.

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2016). *Elementary and middle school*

*mathematics*. Pearson Education UK.

**Course Calendar**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topics** | **Ref Chapters** | **Assignments & Tasks** | **CLOs** |
|  | **Introduction** * Nature of Mathematics
* Importance of Mathematics
* Educational Values of Mathematics
 | Ch 1 AIOU | KWL chartEnlist few applications of mathematics from your own everyday life. | CLO 1 |
|  | * Use of mathematics in everyday life.
* Relationship of Mathematics with other subjects

**Aims & Objectives of Teaching Mathematics** * Aims of teaching Mathematics
* Objectives of teaching Mathematics
 | Ch 1 AIOUHandouts | Use of Mathematics in the Study of another Subject (group work)Physics, biology, chemistry, engineering, medical, agriculture, psychology, economics, logic, fine arts, geography, physical education, and history.  | CLO 1, 2 |
|  | * Need and Importance of Objective–Based Teaching of Mathematics
* Difference between aims and objectives
* Instructional Hierarchy of Outcomes
* Writing objectives
 | Handouts | Write aims and objectives from National Curriculum of Mathematics in Pakistan. | CLO 1,2,3 |
|  | **Methods of Teaching Mathematics*** Significance of methods of Teaching
* Lecture Method
* Inductive Method
* Deductive Method
 | Ch 2 AIOU | Search and write other methods of teaching mathematics  | CLO 4,5 |
|  | * Analytical Method
* Heuristic Method
* Problem Solving Method
* Project Method
* Activity Method
 | Ch 2 AIOU | Students Presentations | CLO 4,5 |
|  | **Techniques of Teaching Mathematics** * Oral work, written work, assigned work.
* Discussions/ Group work.
* Drill and practice
* Self-study
* Home tasks
 | Ch 1 AIOU | Search and write other techniques of teaching mathematics | CLO 4,5 |
|  | **Learning Aids and Mathematics Laboratory** * Learning Aids in Mathematics Teaching
* Modern Learning aids for Mathematics
* Mathematics Laboratory in School
* Use of Low Cost Material (From local context)
* Learner Cantered Activities in Mathematics
* Using Learning Aids in Mathematics Laboratory
* Effective use of Mathematics Laboratory
 | Ch 3 AIOU | Enlist low-cost material used for teaching mathematics  | CLO2,4 |
|  | **Teaching and Learning Mathematics** * Contextual Teaching and Learning
* Effective Questioning
* Mathematical Modeling
* Hands-on, Minds-on, Mathematics
 | Ch 4 AIOU | List of questions that students asked generally. | CLO 4,5 |
|  | Mid Term |  |  |  |
|  | **Planning Lesson Plan** * Meaning and importance of Lesson Planning in Teaching
* Advantages of Lesson Planning
* Qualities of Good Lesson Plan
* Types of Lesson Planning
* Components of Lesson Plan
 | Ch 3AIOU | Select math book of any class and select two topics from them. Start working on two lesson plans. | CLO 4,5,6 |
|  | **Planning Lesson Plan**  |  | Construction of 2 Lesson Plans and presentation  | CLO 4,5,6 |
|  | **The Mathematics Teacher** * Importance and function of a Mathematics teacher
* Qualities and professional qualities of a Mathematics teacher
* Duties and Responsibilities of a Mathematics Teacher
* Making Mathematics teaching more Interesting
* Good/Weak Points in the Teaching of Mathematics
 | Ch 1 AIOU | Reflect on your mathematics class teacher. What qualities do you like most in your math teachers?What qualities will you develop in your being a math teacher? | CLO 2,3 |
|  | **Assessment in Mathematics** * Meanings of assessment and evaluation
* Different Techniques of assessment
* Subjective type tests
* Objective-type tests
* Assignment
* Questioning in Classroom
 | Ch 5 AIOU | Develop 2 question papers on mathematics from 2 different classes.Develop a rubric of your papers. | CLO 4,5,6 |
|  | **Teaching Different Areas of Mathematics** * Teaching of Number System
* Teaching of Arithmetic 1
* Teaching of Arithmetic 2
* Teaching of Algebra
* Teaching of Geometry
* Teaching of Trigonometry/ Statistics
 | Ch 6-9 AIOU | Presentation on a selected topic how to teach -----------? | CLO 4,5,6 |
|  | **History of Mathematics** * Historical review of the development of Mathematics Education.
* Contribution of Muslim Mathematicians.
* Contribution of other Mathematicians
 | Handouts |  | Clo 1,3 |
|  | Final Exams |  |  |  |

**Mapping of CLOs to Direct Assessments**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CLOs▼** | Class Participation | Quizzes | Assignment | Presentation | Mid & Final exams |
| 1 | ✔ | ✔ | ✔ | ✔ | ✔ |
| 2 | ✔ |  | ✔ | ✔ |  |
| 3 | ✔ | ✔ | ✔ | ✔ | ✔ |
| 4 | ✔ |  | ✔ |  |  |
| 5 | ✔ | ✔ | ✔ | ✔ | ✔ |
| 6 | ✔ | ✔ | ✔ | ✔ | ✔ |