

Course Title: Research Methodology for Data Science

Course Code: QM-620

Department: **Information Systems**

**Course Objectives**

This course is planned for research students of MS Data Sciences to develop and enhance their research skills both in research design and data collection. It is therefore divided in two parts. The first part will focus on the philosophy of knowledge; the strengths and weaknesses of various types of research designs as they relate to the aims, objectives and theoretical underpinnings of any piece of research. The second part will introduce students to the principal methods of data collection being used by researchers in the fields of Data Science, Data Analysts and Statistics.

**Learning Objectives**

The objectives of the course are to gain knowledge of following themes:

* To provide students with adequate knowledge to understand and appreciate the nature, complexities and challenges of research in general and Statistics in particular.
* Ethical responsibility towards collection of data and data analysis.
* To help the students to develop an understanding of the theoretical and practical aspects of the methodology of research.
* To equip the students with knowledge and skills that will enable them to exercise choice between available techniques or methods of analysis of data and interpretation of results with reference to the objectives of a particular topic of investigation and
* Enhance the International practices and focus on comparative analysis.
* To enable the students to appreciate the nature and limitations of data / information base of research
* To highlight the deeper implications of results for theory and policy. In other words to understand the issues that are germane to business research and how to deal with them as well as identify areas for further research with an appreciation and understanding of limitations of the results obtained by the candidate himself/herself, which may be specific to a particular method or data base or theoretical framework chosen for analysis.

**Teaching Methodology (List methodologies used –example are given below)**

* Lecture
* Interactive Classes
* Research
* Class activities
* Projects

**STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK**

**Class Policy:-**

* Be On Time

You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.

* Mobile Policy

**TURN OFF YOUR MOBILE PHONE!** It is unprofessional to be texting or otherwise.

* Email Policy

**READ YOUR EMAILS!** You are responsible if you miss a deadline because you did not read your email.

Participants should regularly check their university emails accounts regularly and respond accordingly.

* Class Attendance Policy

A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade ‘F’ (Fail) and will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.

* Withdraw Policy

Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded “F” grade which shall count in the GPA.

* Moodle

UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using moodle, visit <http://oit.umt.edu.pk/moodle>. For further query send your queries to [moodle@umt.edu.pk](mailto:moodle@umt.edu.pk)

* Harassment Policy

Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.

* Use of Unfair Means/Honesty Policy

Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

* Plagiarism Policy

All students are required to attach a “Turnitin” report on every assignment, big or small. Any student who attempts to bypass “Turnitin” will receive “F” grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat “Turnitin”, he/she will receive a second “F” that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

* Communication of Results

The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

**Course Outline**

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| --- | --- |
| Program | MS Data Sciences |
| Credit Hours | 3 |
| Duration | 15 Weeks |
| Prerequisites (If any) |  |
| Resource Person  Name and Email |  |
| Counseling Timing  (Room# ) |  |
| Contact no. |  |
| Web Links:- (Face book, Linked In, Google Groups, Other platforms) |  |

**Chairman/Director Program signature………………………………….Date……………………..**

**Dean’s signature…………………………………………….Date………………………………………….**

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Quizzes 5%

Assignments 10%

Mid Term 20%

Research Activity 50%

Attendance & Class Participation 5%

Presentation 10%

**Total 100%**

**Recommended Text:**

* Advanced Statistical Methods in Data Science by Chen, D.G, Chen J., Lu, X, Yi, G., Yu H.
* Research methods for business: A skill building approach by Sekaran, U., & Bougie, R. (2016). John Wiley & Sons
* Research Methodology: A Step-by-Step Guide for Beginners. (Fourth Edition) by Kumar, Ranjit. (2014). Thousand Oaks, California: Sage Publications
* Research design: Qualitative, Quantitative, and Mixed methods approaches by Creswell, J. W. (2013). Sage publications

**Reference Text:**

* Doing Data Analysis with SPSS,Version18 by Robert H. Carver, Jane Gradwohl Nash Brooke/Cole.

**Course: Research Methodology for Data Sciences Course code:**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Week** | **Topics to be**  **covered in the course** | **Learning Objective**  **of this topic** | **Expected Outcomes from Students** | **Books** | **Assessment Criteria** | | **Deadlines and Homework** |
| 1 | What is Research and Research Methodology? Thinking like a researcher. Research as an inquiry and types of research. Overview of the research process, Science and Scientific Research | To learn the importance of data in real life, how to transform data into information, the role of Research in different disciplines like Businesses and corporate world, To learn primary data collection techniques and Ethics of data handling. | Students will understand some basic background of Research and Research Methodology and its implementation in applied sciences, to understand ethical responsibility of using data in statistical domains. | Creswell – pg. 4-18  Kumar – pg. 1-10  Sekaran –chapter 1 | Assignment # 1  Review a Research Paper | Within a week | |
| 2 | What is a research problem and how to identify and formulate it? Diversity of research strategies for inquiry. The research process: an eight-step model | To learn some of the most frequently used tools and techniques for describing the research. To construct the research process and learn the research strategies. | Students will learn the concepts of research strategies. Students will be trained the applications and implementations of research processes. | Creswell – pg. 49-55  Bhattacherjee – pg. 19-26  Kumar – pg. 1 | Assignment # 2  Title and Objectives of Research  Quiz 1 | Within a week | |
| 3 | Basics of empirical research (How to execute research). Exploring or measuring concepts/constructs, Reliability/ Validity of measures vs. Credibility/ Transformability of observations. The hallmarks of scientific research | To interpret research validity and understand how they are applied in decision making situations. | Students will recognize the data validity techniques with respect to Internal and External validity. | Sekaran –22-26 Bhattacherjee – pg. 11-15 | Assignment # 3  Introduction of Research | Within a week | |
| 4 | Conceptual and research framework. Testable explanations with hypothesis or with research question. Theory testing/theory building. | This topic targets to discuss the logic behind, and demonstrate the techniques for, using sample data to test hypotheses and develop interval estimates about the difference between two population means for independent samples. | Students will become skilled at the use of testing of different hypotheses.  Students will be able to check data direction either accept or reject by using different decision making approaches. | Sekaran –chapter 2 &5 | Assignment # 4  Literature Review of Research | Within a week | |
| 5 | Sampling Strategies for Data collection. Primary vs Secondary data handling techniques. Survey research and its implementation, Questionnaires techniques and structured interviews. | This topic plans to discuss the most important feature of inferential statistics which is hypothesis testing, the situations under which it is used. How it is used in decision making and its significance in terms of completing and carrying out different research projects. | Students will become skilled towards decision making. | Sekaran – Chapter 11 | Quiz 2 |  | |
| 6-7 | Citation and writing formatting (APA) using EndNote and MS. Word. | To learn the citation and writing formatting with International ways. | Students will understand the applications of Research writing in a professional way. | Sekaran – 80-84 | Assignment # 5  Methodology of Research  Presentations 1 | Within a week | |
| 8 | MIDTERM EXAM |  |  |  |  |  | |
| 9-10 | Research Methods: Protocols, open ended and in depth interviews. Case Study Method. Action research Method. Documents/Narratives/Archival Research Method | This topic plans to discuss the most important feature of research methods. How it is used in decision making and its significance in terms of completing and carrying out different research. | Students will become skilled towards decision making and towards research output. | Bhattacherjee – pg. 94-104 | Assignment # 6  Data Submission and DataAnalysis of Research | Within a week | |
| 11 | Statistical Models. Statistical Procedures of Analysis using SPSS, MS Excel and R Language. | These topics intend to discuss different statistical software’s for data analyses | Students will become skilled at the applications of different areas of study using Statistical Software’s. |  | Quiz 3 |  | |
| 12-13 | Writing a research proposal. | Learn a Research work to create impact. | Students will become skilled at the applications of research in different disciplines |  | Assignment # 6  Final submission of Proposed Work | Within a week | |
| 14 | Submission of Research Papers | Discussion about a Impact factor Research | Students will become skilled towards research completion. |  | Assignment # 6  submission of Research Paper | Within a week | |
| 15 | Research Paper Presentations | To Develop students skills | To Introduce a Impact factor Research |  | Presentations of Final Research Papers |  | |