Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2021-2022

Course Handout Part II

Date: 31-12-2021

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **BITS G661**
Course Title : **Research Methodology I**
Instructor-in-Charge : Dr. **Satyapaul A. Singh**
Instructors : **Dr. Debirupa Mitra**

Scope and Objective of the Course:

This course introduces the student to the scientific method of conducting research and will provide a practical framework on which a student can base his/her research. The objective of this course is to inculcate a systematic approach to research including formulating a research topic, testable hypothesis, designing experiments, collecting and analyzing data and presenting their research in the form of reports, articles, thesis and seminars. The course also introduces the student to various analytical instruments and equipment commonly used in research laboratories as well as tools for data analysis. As part of the course, students will work on projects in which they can integrate the concepts learnt in class.

Textbooks:

1. C.George Thomas "Research Methodology and Scientific Writing", Ane Books Pvt. Ltd., 2015.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-2	Describe the elements of research and the scientific method	Need for academic research Introduction to the scientific method Research methodology and research methods	1
3	Identify the approaches to research Differentiate between types of research	Formal and informal approaches to research Basic versus applied research, Qualitative and Quantitative research, Experimental research, Variables in research	3
4-11	Formulate a hypothesis Design experiments using statistical tools Understand the significance of controls	Cause effect relationships, hypothesis, experiments, errors, use of controls, Statistical design of experiments, Taguchi methods Framing a hypothesis	4, 5
12-20	Collect relevant data Analyze data using	Data collection and record keeping Data analysis	6, 11

	statistical tests Represent data appropriately in tables, graphs, etc.	Statistics – commonly used tests, Grey relational analysis (GRA) Representing data – tables versus figures Illustrations, Types of graphs Use of tools such as MS Excel, Origin	
21-24	Carry out a thorough literature review and summarize Identify and use tools to store and organize literature	Importance of reviewing the literature Sources available Locating relevant literature Reliability of sources Note making, Paraphrasing, Writing a review Citing literature	8, 12
25-30	Write a paper Describe the elements of a journal article, thesis Make clear and well defined presentations Present ideas, data and results in a forum	Scientific writing – grammar, writing styles, Writing research papers, review papers, thesis Selecting a journal Editing, formatting, Referencing Review and peer review, Proofreading Presentations, posters, How to present in seminars	10, 13, 14
31	Understand the ethical aspects of research	Ethics in research, Plagiarism Intellectual Property Rights Unscientific practices, Whistle blowing	15
32-40	Explain the principle involved in various analytical instruments and equipment	Demonstrations of equipment such as DSC, TGA, FTIR, Microscopes, spectrophotometer, chromatography systems, UTM, XRD, XRF, SEM and others. Analysis of data and images.	Lab manuals

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid term	90 minutes	25%	TBA	OB
Assignments	TBA	20%	TBA	OB
Seminars	TBA	15%	TBA	OB
Comprehensive Examination	2 hrs	40%	TBA	OB

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable

Chamber Consultation Hour: TBA

Notices: Will be uploaded on CMS website

Make-up Policy: Make up will only be granted for genuine reasons and only with prior permission.

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Dr. Satyapaul A. Singh
INSTRUCTOR-IN-CHARGE