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**Course: Methodology of Graduation Thesis Preparation.**

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# Lecture N 02 –

# Characteristics and Types of Scientific Research

## 1. Characteristics and Principles of Scientific Research:

Scientific research has a set of characteristics that distinguish it from other forms of knowledge:

- **Organization**: It is not a random process but a structured activity that follows logical and sequential steps.
- **Objectivity**: Findings are based on evidence and proof, not on personal opinions or subjective impressions.
- **Testability and Verifiability**: Others can replicate the research under the same conditions to verify the results.
- **Generalizability**: The results can often be applied to other similar situations.
- **Cumulativeness**: Scientific knowledge is cumulative; each research study builds on previous work, adding a new piece to human knowledge.
- **Predictive Power**: Science does not just describe phenomena; it seeks to understand their causes and predict their future occurrence.

## 2. Types of Scientific Research:

Scientific research can be classified according to several criteria. The most common classifications are:

By Purpose:

- **Basic (or Pure) Research**: Its primary goal is to advance knowledge and develop new theories and concepts, without immediate concern for practical applications.
- **Applied Research**: Aims to find practical solutions to existing, specific problems, such as developing a cure for a disease or improving a production process.

By Method:

- **Descriptive Research**: Aims to describe a phenomenon and its characteristics as they exist in reality.
- **Historical Research**: Studies the past to understand the present and predict the future by analyzing historical documents and sources.
- **Experimental Research**: Involves intentionally changing one variable (the independent variable) and measuring the effect of this change on another variable (the dependent variable) in a controlled environment.

By Data Type:

- **Quantitative Research**: Deals with numerical data and statistics, aiming to measure phenomena and identify relationships between variables.
- **Qualitative Research**: Focuses on understanding phenomena in-depth by analyzing non-numerical data, such as interviews, observations, and texts.

### 3. Types of Scientific Methods:

The method is the path a researcher takes to answer their research questions, & Key methods include:

- **Descriptive Method**: The most common method, used to describe phenomena and gather facts about them. Its tools include surveys and case studies.
- **Historical Method**: Relies on the critique and analysis of historical sources to understand and interpret past events.
- **Experimental Method**: Considered the most rigorous scientific method, used in natural and social sciences to test hypotheses by controlling variables.
- **Inductive Method:** Moves from the specific to the general; i.e., from observing individual cases to forming a general law.
- **Deductive Method**: Moves from the general to the specific; i.e., from a general rule or theory to applying it to individual cases.