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ETHICS



Ethics

Ethics is a set of moral principles and rules that guide individuals' behaviors and decisions. It aims to determine what is right and wrong when evaluating individuals' actions within society. Ethics encourages fair and responsible behavior in a specific context and serves as a guiding framework for people.



General Terms

Engineers have an ethical and social responsibility to themselves, their clients, and to society.

Practically (although there is much debate about this), engineering ethics is about balancing cost, schedule, and risk.

- **Normative ethics – (general)** Which “action guides” are worthy of moral acceptance and for what reasons? Action guides include theories, principles, rules, and maxims.
- **Normative ethics – (applied)** Professional codes of ethics that specify role norms or obligations that professions attempt to enforce.
- **Tacit ethic** – unsaid, unspoken rule of practice.



General Terms

- **Utilitarianism** seeks to produce the most utility, defined as a balance between good and bad consequences of an action, taking into account the consequences for everyone affected
- **Duty ethics** argues that there are duties that should be performed regardless of whether these acts lead to the most good
- **Rights ethics** emphasizes that we all have moral rights, and any action that violates these rights is ethically unacceptable
- **Virtue ethics** regards actions as right, that manifest good character traits (virtues) and regards actions as bad, that display bad character traits (vices)



Difference between Morality and Ethics:

- **Morality:** Behavior based on societal values and rules.
- **Ethics:** Analyzes moral principles on a theoretical level and offers a philosophical perspective.



Scientific Data Collection and Measurement Methods

One of the key components of scientific research is the data collection process. Data collection involves systematically gathering the information needed to answer research questions. The main scientific data collection methods include:

- **Surveys and Questionnaires:** These are structured sets of questions used to gather individuals' opinions or experiences on a particular subject.
- **Observation:** A method where the researcher collects data by directly observing an event or situation. It can be structured (based on predefined categories) or unstructured.
- **Interviews:** A qualitative method in which the researcher collects data by conducting one-on-one interviews with individuals. These can be semi-structured or informal in format.



- **Experimental Method:** A method based on measuring the effects of variables under controlled conditions. Data is collected using experimental and control groups.
- **Archival Research:** Studies that use previously collected data sets or documents. For example, historical records, statistical data, or documents are analyzed.
- **Interpretive Methods:** Particularly in social sciences, qualitative data collection methods used to understand people's experiences, such as focus group discussions.



Concepts of Validity and Reliability in Scientific Research

The accuracy and reliability of data in scientific research are crucial. Two key concepts in this regard are validity and reliability.



Validity: Refers to the extent to which a measurement tool or method accurately measures what it is intended to measure. In other words, it evaluates whether the research findings are appropriate for the research question.

- **Internal Validity:** Determines whether the independent variable truly affects the dependent variable in experimental research. It relates to the variables controlled within the study.

- **External Validity:** Examines whether the research results can be generalized beyond the environment in which the research was conducted.

- **Face Validity:** Refers to the initial impression of whether a measurement tool seems to measure the intended concept based on its appearance.



Reliability: Refers to the consistency of a measurement tool. It assesses whether the tool produces the same results under the same conditions when repeated.

- **Test-Retest Reliability:** Tests whether the same measurement tool provides similar results when applied at different times.

- **Internal Consistency:** Evaluates how consistently all items within a measurement tool measure the same concept. For example, different questions in a questionnaire are expected to yield similar responses.

- **Inter-Rater Reliability:** Occurs when multiple observers reach the same conclusions while observing the same situation.



Ethical Issues in Scientific Research

During the scientific research process, various ethical issues may arise. Among these issues are conflicts of interest, data manipulation, and the risk of harm to participants. Common ethical problems include:

- **Conflicts of Interest:** The potential for a researcher's personal or financial interests to influence research outcomes.
- **Data Manipulation:** Altering data to make research results appear more "interesting" or creating bias in the findings.
- **Privacy Violations:** Disclosing or misusing participants' personal information without consent.
- **Misrepresentation of Research Findings:** Presenting scientific results in an incomplete or misleading manner can lead to serious consequences that misinform the public.



Questionable and clearly wrong engineering practices

Engineers have a responsibility to adhere to ethical practices and standards. Engaging in questionable or clearly wrong practices not only jeopardizes safety and quality but can also lead to legal consequences and damage to the engineering profession's reputation.



Questionable and clearly wrong engineering practices

1. Ignoring Safety Standards

- Example:** Skipping safety tests or not adhering to building codes can lead to structural failures, injuries, or fatalities.
- Impact:** Compromises public safety and can result in catastrophic events, such as building collapses or industrial accidents.

2. Poor Material Selection

- Example:** Using substandard or inappropriate materials for a project, such as low-quality concrete in construction.
- Impact:** Leads to decreased durability and reliability, risking the integrity of structures or products.



Questionable and clearly wrong engineering practices

3. Falsifying Test Results

- **Example:** Manipulating data from material tests or performance evaluations to make a product seem safer or more efficient than it is.
- **Impact:** Erodes trust, can result in legal penalties, and endangers users.

4. Neglecting Environmental Impact

- **Example:** Failing to conduct environmental assessments before starting construction or industrial projects.
- **Impact:** Causes ecological damage, pollution, and potential legal action from regulatory agencies.



7. Ignoring Maintenance Protocols

- Example:** Designing equipment without considering ease of maintenance or not following maintenance schedules.
- Impact:** Leads to premature equipment failure and safety risks.

8. Designing for Cost Over Quality

- Example:** Prioritizing cost-cutting measures over quality in design and production, such as reducing safety features.
- Impact:** Compromises the reliability and safety of the product or structure.

9. Using Outdated or Inadequate Technology

- Example:** Continuing to use outdated engineering practices or technologies that do not meet current standards.
- Impact:** Results in inefficiency, increased risk of failure, and non-compliance with modern regulations.



Questionable and clearly wrong engineering practices

10. Disregarding Ethical Considerations

- Example:** Engaging in practices that prioritize profit over safety or environmental concerns, such as covering up faults or failures.
- Impact:** Leads to harm to individuals, communities, and the environment, and can damage the reputation of the engineering profession.

11. Lack of Transparency

- Example:** Not disclosing potential risks or failures to stakeholders, including clients and regulatory bodies.
- Impact:** Can result in mistrust, legal issues, and harm to public safety.



5. Lack of Proper Documentation

- Example:** Not keeping accurate records of design changes, calculations, or material specifications.
- Impact:** Creates confusion, makes it difficult to troubleshoot issues, and can lead to liability problems if failures occur.

6. Inadequate Risk Assessment

- Example:** Not evaluating potential hazards in design or construction processes.
- Impact:** Increases the likelihood of accidents and may expose organizations to liability.



Scientific research necessitates adherence to ethical principles while contributing to the collective knowledge and well-being of society. Researchers must act within the framework of scientific integrity and respect for human rights. Upholding ethical principles enhances the credibility of scientific research and maximizes its benefits to society.



Ethical Principles in Scientific Research

Ethical principles in conducting scientific research ensure that the research is carried out in a reliable, fair, and respectful manner. These principles help researchers fulfill their responsibilities to participants, society, and the scientific community. The key ethical principles are:



Autonomy is defined by the right to self-determination and respects the individual's right to make informed decisions.

Honesty: Researchers must act with accuracy and honesty in collecting, processing, and presenting data. Misleading or manipulative information should be avoided.

Justice: Participants in scientific research should be treated equally, and discrimination must be avoided. It is important that everyone has equal access to the potential benefits of the research.

Nonmaleficence (Do No Harm): Participants should not experience physical, psychological, or social harm during the research process. Their safety, confidentiality, and well-being should be prioritized.



Informed Consent: Individuals participating in research must be fully informed about the purpose, methods, risks, and potential outcomes of the research and must voluntarily agree to participate.

Confidentiality and Privacy: Personal information and data of participants should be kept confidential. It must be ensured that the data is used solely for research purposes, and the identities of individuals must be protected.

Beneficence relates to mitigating or preventing harm and creating practices and environments that help others achieve their maximum health potential.



Ethical Violations in Scientific Research

Failure to adhere to ethical guidelines in scientific research and professional life can lead to serious consequences in both the scientific community and society at large. Here are some examples of ethical violations and explanations of why these situations contravene ethical principles:

1. Tuskegee Syphilis Study (1932-1972)

1. **Ethical Violation:** The Tuskegee Syphilis Study was a medical research project conducted in the United States involving African American men. Participants were not informed about their syphilis diagnosis and were not treated for the disease. The purpose of the study was to observe the natural progression of syphilis. Informed consent was not obtained, and participants were denied effective treatment throughout the study.



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- 2. Reason for Violation:** This study violated the principles of informed consent and non-maleficence. Participants were kept in the dark about their illness, denied treatment, and allowed to suffer for the sake of research outcomes. Such practices endanger lives and violate human rights.



2. Milgram Experiment (1961)

•**Ethical Violation:** Psychologist Stanley Milgram conducted a series of experiments to test how far people would go in obeying authority figures. Participants were led to believe they were administering high-voltage electric shocks to others (who were actually actors). They were not informed that no one was harmed, and they experienced significant stress during the experiment.



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•**Reason for Violation:** This situation violates the principles of non-maleficence and informed consent. Participants experienced severe emotional distress and were misled about the true nature of the experiment. Subjecting individuals to stress without full disclosure is considered unethical.



3. Andrew Wakefield's Study on Autism and Vaccines (1998)

•**Ethical Violation:** Andrew Wakefield published a paper in 1998 claiming a link between autism and the childhood MMR (measles, mumps, rubella) vaccine. This study led to widespread distrust and resistance to vaccines. However, it was later revealed that Wakefield manipulated data and had conflicts of interest. The study included numerous unethical practices and was subsequently retracted.



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•**Reason for Violation:** This situation violates principles of honesty, conflict of interest, and non-maleficence. Wakefield presented false data, concealed conflicts of interest, and ultimately caused millions to distrust vaccines, jeopardizing public health. Spreading misinformation that threatens community health is a serious ethical breach.



Facebook's Emotional Manipulation Experiment (2014)

•**Ethical Violation:** In 2014, Facebook manipulated the news feeds of 700,000 users to influence their emotional states. Users were unaware that they were part of this experiment, and Facebook did not seek consent from them.



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- Reason for Violation:** This situation contravenes the principles of informed consent and privacy. Users were subjected to emotional manipulation without their knowledge or consent, posing risks to their mental well-being.



Hwang Woo-suk's Cloning Research (2004-2005)

•**Ethical Violation:** South Korean scientist Hwang Woo-suk falsified data in his papers regarding human embryo cloning and stem cell research. It was also revealed that he pressured his research assistants to act as egg donors.



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•**Reason for Violation:** This situation violates principles of honesty, informed consent, and coercion. Scientific fraud undermines the credibility of research by presenting fabricated findings instead of reliable data. Furthermore, pressuring lab staff and intervening in their bodies without consent constitutes unethical behavior.



Guatemala Syphilis Experiment (1946-1948)

•**Ethical Violation:** A study funded by the U.S. government in the 1940s involved deliberately exposing prisoners, soldiers, and patients with mental illnesses in Guatemala to syphilis and gonorrhea without their consent. Infected individuals were not informed and received no treatment.



Guatemala Syphilis Experiment (1946-1948)

- Ethical Violation:** A study funded by the U.S. government in the 1940s involved deliberately exposing prisoners, soldiers, and patients with mental illnesses in Guatemala to syphilis and gonorrhea without their consent. Infected individuals were not informed and received no treatment.
- Reason for Violation:** This study severely violated the principles of non-maleficence and informed consent. Participants were exposed to dangerous diseases without knowledge, suffering serious health consequences. The experiment represented a gross violation of human rights.



Stanford Prison Experiment (1971)

•**Ethical Violation:** Conducted by psychologist Philip Zimbardo, the Stanford Prison Experiment involved assigning participants the roles of prisoners and guards in a simulated prison environment. Participants assigned as guards began to inflict psychological and physical abuse on those assigned as prisoners. The experiment continued uncontrollably, resulting in severe trauma for participants.



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•**Reason for Violation:** This experiment violated the principles of non-maleficence and participant safety. It had a profoundly negative impact on participants' mental health and promoted violent behaviors. Zimbardo's delay in terminating the experiment further exacerbated the ethical breaches involved.



In Turkey, the appropriate institutions to report ethical violations depend on the area in which the violation has occurred. Here are some institutions that can be approached in such cases:

1. Council of Higher Education (YÖK) Ethics Committee: This body can be approached for violations related to academic research, such as plagiarism or fraud.

2. University Ethics Committees: Each university has its own ethics committee that examines violations of research ethics.

3. Scientific and Technological Research Council of Turkey (TÜBİTAK): This institution can be contacted for ethical violations in scientific research projects.



4. Ministry of Health Clinical Research Ethics Committee: This committee addresses violations related to clinical research and medical trials.

5. Professional Chambers (e.g., Turkish Medical Association (TTB), Union of Chambers of Turkish Engineers and Architects (TMMOB), Turkish Dental Association (TDB)): These organizations handle professional violations in fields like medicine, engineering, and dentistry.

6. Public Prosecutor's Office: Legal proceedings can be initiated for serious ethical violations.

7. Personal Data Protection Authority (KVKK): This authority is responsible for addressing violations of personal data protection.

These reports can be directed to different institutions depending on the type and severity of the ethical violation, and legal avenues may be pursued if necessary.



IT IS YOUR TURN



1 While you are just starting a six-month contract job, you are getting a perfectly staffed job offer from elsewhere. Would you accept the suggestion immediately?

2 Your friend forgets a book he lent to you. You want this book to be available to you and you cannot find a copy. Can you remind your friend about the book?

3 Would you object to a rare resource being placed at the disposal of someone you think will not be able to benefit well from it?

4 Success grades are calculated according to the relative evaluation system. Before the exam for a critical course, a group of students agree to lower the class average. You are offered to join the group. Would you accept it?



5 Do you find it appropriate for scientists to directly publicize the results of their research, their discoveries through a press conference?

6 You are outside the city for a land survey for a case where you have been appointed as an expert. Would you accept the plaintiff's offer of hospitality at their hotel?

7 A friend asks you to write a reference letter for him. You believe that your friend does not have the qualifications required for this job. Would you agree to write the letter?

8 A friend wants to exchange with you by copying and cracking an expensive computer program that you can use in your graduation project. Would you accept it?