Engineering Ethics

HOWARD UNIVERSITY

Academic Code of Student Conduct

NATIONAL SOCIETY OF BLACK ENGINEERS

Member Code of Conduct

Engineering as a Profession

- **Professions** includes fields such as engineering, medicine, the clergy, and law.
- **Profession** is a field of work involving:
  - Systematic, advanced expertise:
    - Through accredited undergraduate programs
    - Through experience as a practicing engineer
  - Self-regulation:
    - Enjoy freedom to govern itself
      - Through licensure
      - Through enforcement of ethics codes.
  - Commitment to the public good:
    - Serving the greater public good by high moral and ethical standards as defined by ethics code.

(a) Systematic, advanced expertise

- **Engineer in Training (EIT)** (Fundamentals of Engineering (FE) Exam) and **Professional Engineer (PE)** (Principles and Practices of Engineering Exam)

FE EXAM

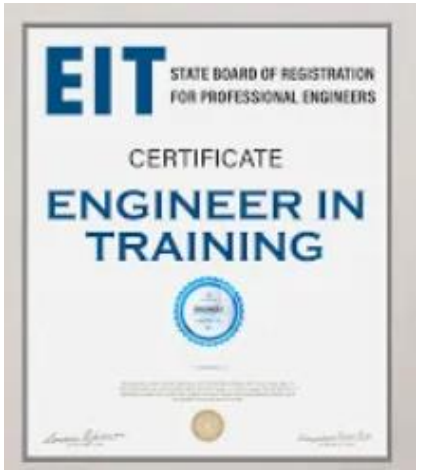
The Fundamentals of Engineering (FE) exam is generally your first step in the process to becoming a licensed professional engineer (P.E.).

PE EXAM

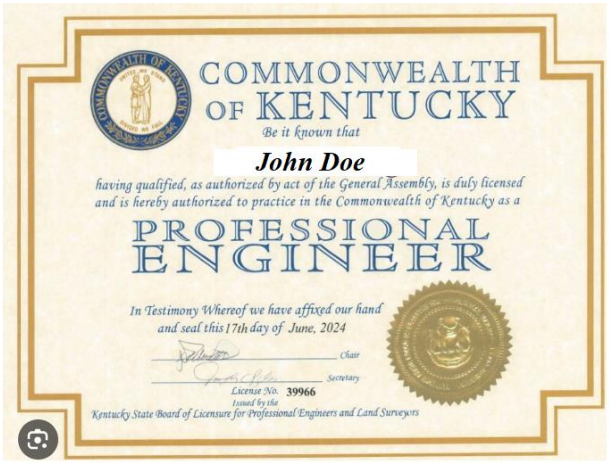
The Principles and Practice of Engineering (PE) exam tests for a minimum level of competency in a particular engineering discipline.

NCEES
National Council of Examiners for Engineering and Surveying

Certification of Engineer in Training (EIT)



Professional Engineer (P.E.) License



(b) Self-Regulation

- Self-regulation is exercised through the professional organizations of each discipline and through licensure.

IEEE
Advancing Technology for Humanity

NATIONAL SOCIETY OF BLACK ENGINEERS

SAE
Society of Automotive Engineers

acm
Association for Computing Machinery

NSPE
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(c) Commitment to the Public Good

- Engineers impact people.
- the power to impact society comes with the **responsibility** to do so in the public's best interest.
- **Public**:
  - is blind to the impact that engineers have on their daily lives.
  - holds an implicit trust that engineered products will work properly.
  - is not present when engineering design decisions are made.
- **Engineer's role** is to represent society and to ensure their safety and well-being.
- **The rules of engineers' roles** for public good are the set of values formulated as ethics codes.

Professionalism and Ethics

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- NSPE code of ethics – Hierarchy of sections
  - Sec 1 (the Fundamental Canons): Main issues from an ethical and professional standing
    - Sec 2 (Rules of Practice): First part of the fundamentals of canons in detail
      - Sec 3 (Professional Obligations): The last point of the fundamentals of canons, focused on professional conduct from a legal, ethical, and societal viewpoint

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Code of Ethics

- Fundamentals of Canons

  While fulfilling professional duties, engineers shall

  1. Hold paramount the safety, health, and welfare of the ( )
  2. Perform services only in the areas of their ( )
  3. Issue public statements only in an ( ) and truthful manner
  4. Act for each employer or client as ( ) agents or trustees
  5. Avoid ( ) acts
  6. Conduct themselves **honorably, responsibly, ethically, and lawfully** so as to enhance the ( ), reputation, and usefulness of the profession

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Code of Ethics

- Rules of Practice (partial list)
  - (Canon 1) Hold paramount the safety, health, and welfare of the public
    - If engineers' judgment is overruled under circumstances that endanger life or property, they shall ( ) their employer or client and such other ( ) as may be appropriate
    - Engineers having knowledge of any alleged violation of this Code shall ( ) thereon to appropriate professional bodies and, when relevant, also to public authorities, and ( ) with the proper authorities in furnishing such information or assistance as may be required.

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Code of Ethics

- Rules of Practice (partial list)
  - (Canon 3) Issue public statements only in an objective and truthful manner.
    - Engineers shall issue no statements, criticism, or arguments on technical matters that are inspired or ( ) for by interested parties, unless they have prefaced their comments by explicitly ( ) the interested parties on whose behalf they are speaking, and by revealing the existence of any ( ) the engineers may have in the matters.

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Code of Ethics

- Rules of Practice (partial list)
  - (Canon 4) Act for each employer or client as faithful agents or trustees
    - Engineers shall disclose all known or potential ( ) of interest that could ( ) or appear to ( ) their judgment or the quality of their services
    - Engineers shall not solicit or ( ) financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.

Howard University Academic Code of Student Conduct

HOWARD UNIVERSITY

Search or A-Z Directories

Students • Faculty / Staff • Pa

https://www.howard.edu/policy/academic/student-conduct.htm

Academic Code of Student Conduct

<< Index of Academic Policies & Procedures

(Revised 2010)
Approved by the Board of Trustees, June 29, 2010

Howard University is a community of scholars composed of faculty and students both of whom must hold the pursuit of learning and search for truth in the highest regard. Such regard requires adherence to the goal of unquestionable integrity and honesty in the discharge of teaching and learning responsibilities. Such regard allows no place for academic dishonesty. To better assure the realization of this goal any student enrolled for study at the University may be disciplined for the academic infractions defined below.

Definitions of Academic Infractions

1. **Academic Cheating**—any intentional act(s) of dishonesty in the fulfillment of academic course or program requirements. This offense shall include (but is not limited to) utilization of the assistance of any additional individual(s), organization, document, or other aid not specifically and expressly authorized by the instructor or department involved. (Note: This infraction assumes that with the exception of authorized group assignment or group take-home assignments, all course or program assignments shall be completed by an individual student only without any consultation or collaboration with any other individual, organization, or aid.)

2. **Plagiarism**—to take and pass off intentionally as one's own the ideas, writings, etc. of another without attribution (without acknowledging the author).

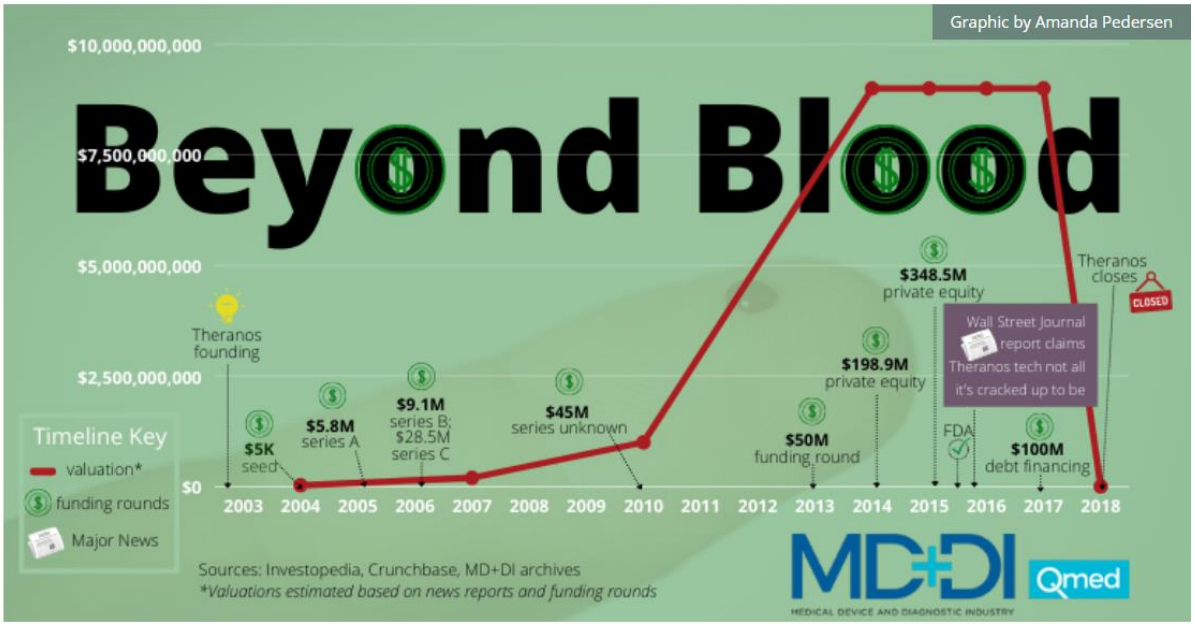
3. **Copy Infringement**—Copy infringement occurs when a copyrighted work is reproduced, distributed, performed, publicly displayed, or made into a derivative work without the permission of the copyright owner.

Howard University Academic Code of Student Conduct

- HU is a community of scholars composed of faculty and ( )
- Both must hold the pursuit of ( ) and search for ( ) in the highest regard
- Such regard requires adherence to the goal of unquestionable ( ) and ( ) in the discharge of teaching and learning responsibilities.
- Such regard allows no place for academic ( ).
- Academic infractions:
  - **Academic cheating:** any additional assistance
  - **Plagiarism:** intentionally taking off as one's own of another
  - **Copy infringement:** reproduction of copyrighted works without permission

Unethical Behaviors & Their Consequences

- **Theranos** Scandal



theranos

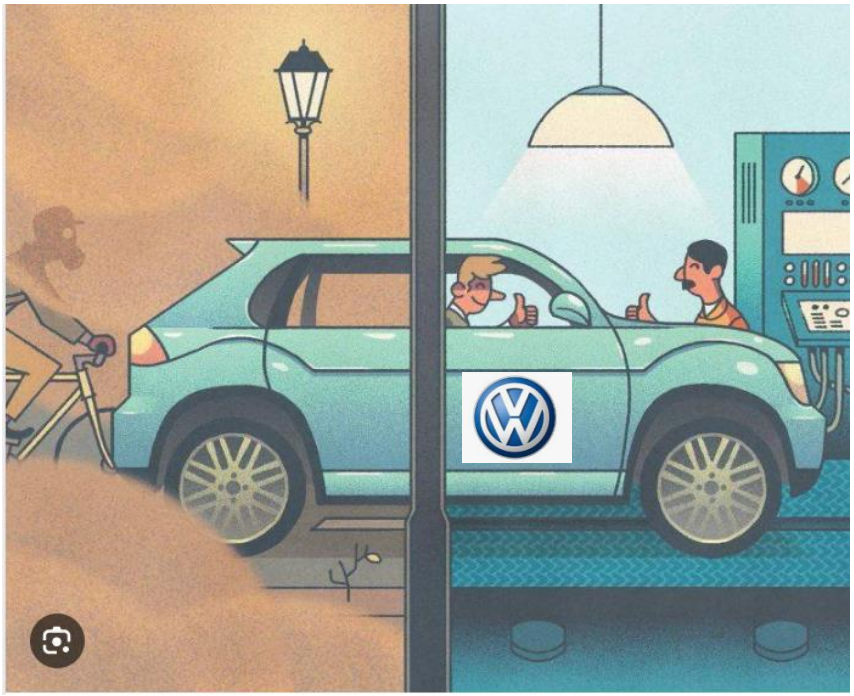
Credit: Alden Chadwick/Flickr, CC BY 2.0

BBC NEWS

Theranos scandal: Who is Elizabeth Holmes and why was she on trial?

19 November 2022

Unethical Behaviors & Their Consequences



- **VW Emission Scandal**
  - Many VW cars being sold in America had a "defeat device" - or software - in diesel engines that could detect when they were being tested, changing the performance accordingly to improve results.
  - The German car giant has since admitted cheating emissions tests in the US.

- Consequences
  - One of the most significant legal consequences of the scandal was the $4.3 billion criminal fine imposed on Volkswagen by the U.S. Department of Justice.
  - This was the largest criminal fine ever imposed on an automaker at the time, and it represented a major blow to Volkswagen's financial stability.

Technical Essay on Ethics – Subject

- Title: "**Consequences of unethical behavior in <u>Takata Airbag</u> Scandal**"

- Relevant sources/resources
  - https://www.bloomberg.com/news/features/2016-06-02/sixty-million-car-bombs-inside-takata-s-air-bag-crisis
  - http://www.autonews.com/article/20160718/OEM11/160719854/honda-audit-finds-takata-engineers-manipulated-airbag-test-data
  - https://www.nytimes.com/2014/11/07/business/airbag-maker-takata-is-said-to-have-conducted-secret-tests.html
  - https://insight.ieeeusa.org/articles/backscatter-ethics-and-airbags/

Technical Essay on Ethics – Individual Assignment

- **Technical Essay Subject**: “Consequences of unethical behavior - Takata Airbag Scandal”
- Essay should answer the following questions
  1. When did this scandal happen?
  2. What was the root cause of the scandal?
  3. Which two (2) NSPE fundamental canons were violated in this scandal?
  4. What’s the consequence of the unethical behavior?

How to write technical essay

- Technical Writing (Essay/Report) is NOT
  - A fiction nor creative writing
  - Casual conversation
  - A suspense/detective story
- Technical Writing (Essay/Report) IS
  - Information dissemination
  - Very different from how people normally speak and talk
- Technical Writing IS
  - To be Direct
  - To be Concise

Technical Writing Mechanics - Voice

- Voice: Use **3rd person**, (**3rd person active)** voice
  - "We considered several designs." (1st person, active voice)
  - **"The team considered several designs." (3rd person, active voice)**
  - "Several designs were considered." (3rd person, passive voice)
  - General rule: Avoid first person unless it's very awkward to reword to 3rd person → **The 5th question of the Ethics Essay**

Technical Writing Mechanics - Voice

- Voice:
  - **How to avoid 1st person**

1st Person	**Possible Alternatives**
Our design consists of two FPGA chips.	
We tested our circuit.	
We meet to discuss the problem.	
We used four sensors to detect obstacles in our design.	

Technical Writing Mechanics – Brevity

- Word Usage: B**revity !!!**
- Avoid wordy phrases or sentences
  - "In the course of the event" → ""
  - "Describe how the product did behave" → ""
  - "Come up with" → ""
  - "The team ended up with a design" → ""
  - "The team carried out three experiments" → ""
  - "As everyone knows, computers are .." → ""
  - "The over is black in color" → ""
  - "It is interesting to observe that five of ten .." → ""

Technical Writing Mechanics – No Slang No Jargon

- Word Usage: **Avoid technical slang and jargons !!**
- Avoid informal (slang, jargon) and conversational words and phrases

"Three concepts made the final cut" → ""

"The vehicle went haywire during testing" → ""

"The team really messed up by using glue" → ""

Practical matters

- Situation 1
  - Dr. Kim: How was your summer?
  - **Tom**: I was in Houston working for the Chevron as a summer intern. (→ this 1 sentence compressed Tim's entire summer experience with Chevron)
  - Dr. Kim: Wow! Tell me more about it
  - **Tom**: In May, I was accepted ….

    …..

    ….

    ….

    (→ main part which extends the above 1 sentence)

  -Dr. Kim: Thanks

Practical matters

- Situation 2
  - Dr. Kim: I heard you interned at Chevron. How long was it Where was the location? What kind of work had you been assigned to? What was the funniest part of you summer with Chevron?
  - **Tom**: Chevron internship was 12 week long assignment. My work was performed in Houston, Texas, and it was of controlling pumps and valves in the field. The most interesting experience with Chevron was no limit of enjoying Texas-style BBQ every weekend. (→ this summary answers all the questions)
  - Dr. Kim: Wow! Tell me more about them
  - **Tom**: The 12 weeks were full of activities. In the first week, ….

  I was first assigned to work at Brenham but from the first day, I was put in to a Houston site. Houston was hot and muggy ….. I was first assigned to software development but immediately changed to control department. It was ….. There were a lot of events for summer interns and I love Texas style BBQ and it was free…. (→ main part which extends the above summary with more information)

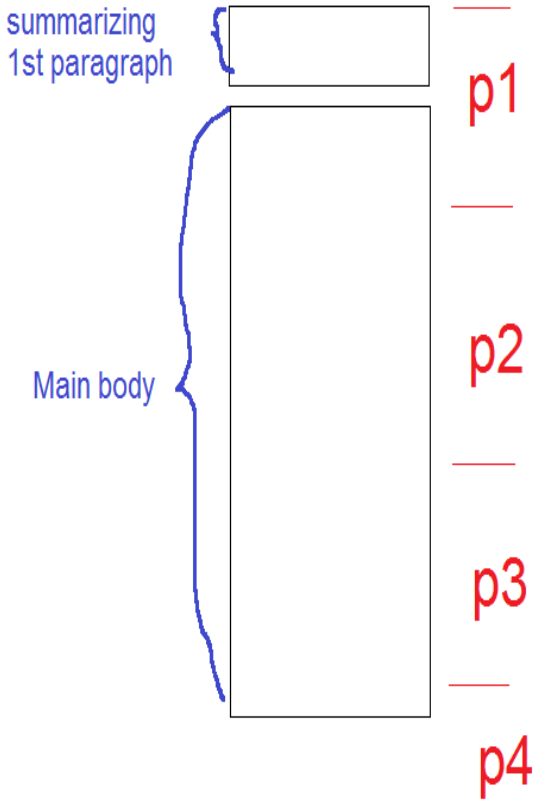
  -Dr. Kim: Thanks

How to write well for Senior Design class

- People are more likely to read subjects/writings/emails that create curiosity or provide utility.
- When they are busy
  - Curiosity fades in importance
  - They read only the ones with practical importance [“utility”]
- So how do we write: **(a) Active voice, (b) Brevity, and (c) no slangs or jargons.**
- And write as follows:
  - Write the entire essay answering all the question in detail and sufficiently [Main Body]
  - Summarize the essay concisely without omitting any part of the answers. [1st paragraph]
  - Rewrite the 1st paragraph to further reduce the number of words (for an award !)

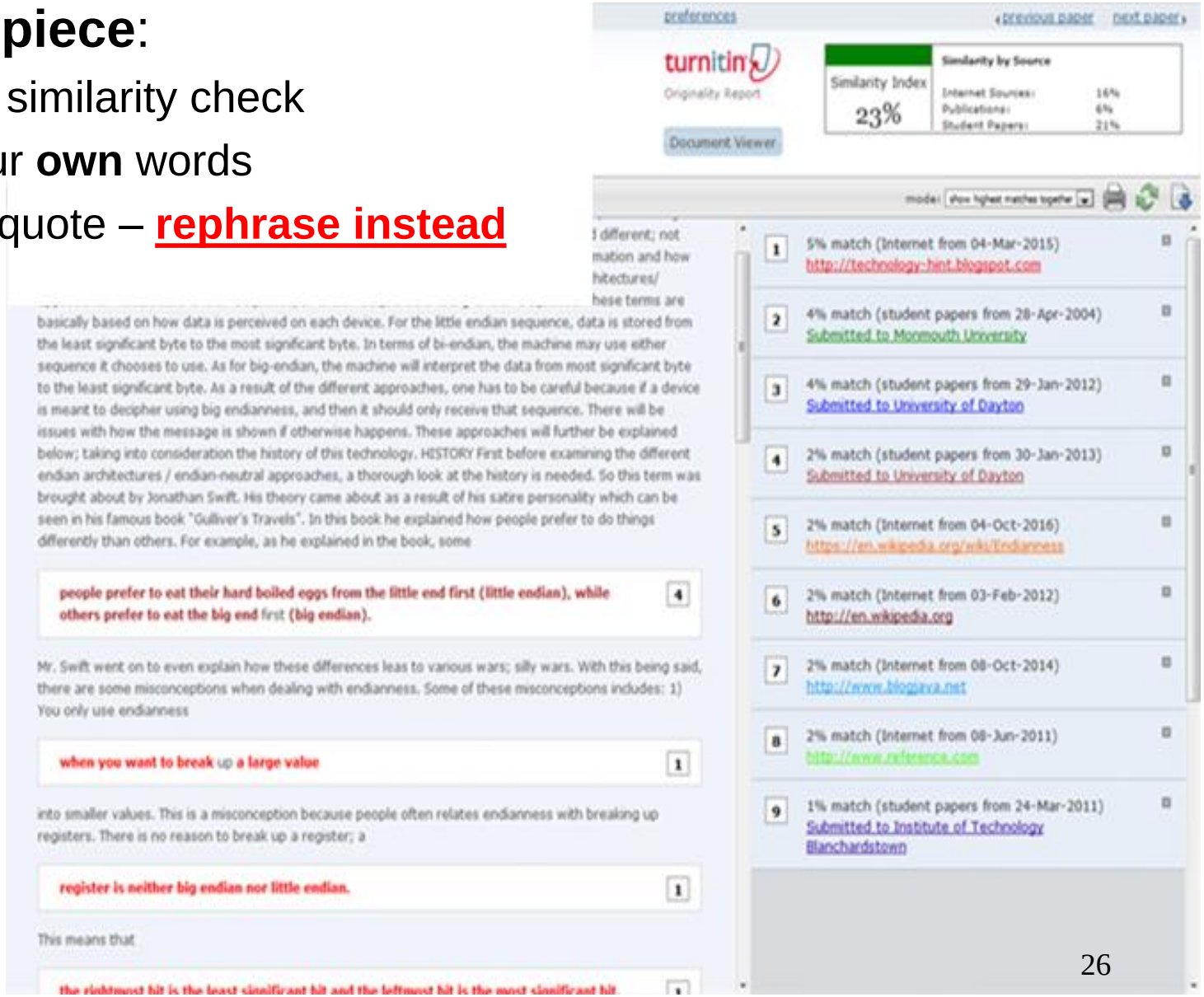
How to write well for Senior Design class

- Mechanics
  - 3rd person
  - Brevity and concise and direct
  - No abuse of technical jargons
  - Use complete sentence with correct grammar
- Style
  - The assigned/given essay question has to be summarily answered in the first paragraph.
  - The second paragraph will be considered the start of the main body.
  - The main body contains the main body of the essay. The main body, in terms of length or word count, must be at least 4 times of the 1st paragraph.
  - Text only – no graphics no photos no images



How to write well

- **One last piece**:
  - *Turnitin* similarity check
  - Use your **own** words
  - Do **not** quote – **rephrase instead**



Scoring Rubric

	1st Paragraph	**Main Body**
50	All given questions are answered concisely written in 3rd person with correct grammar and no abuse of jargons	All given questions are extensively written for answer in 3rd person with correct grammar and no abuse of jargons with its length **4 times or more** of the 1st paragraph.
40	Only parts of the questions are answered concisely written in 3rd person with correct grammar and no abuse of jargons	Only parts of the questions are extensively written for answer in 3rd person with correct grammar and no abuse of jargons with its length **4 times or more** of the 1st paragraph.
20	The questions are answered with wordy phrases and some grammar errors	The questions are somewhat expanded with some grammar errors
10	The questions are not summarily answered	The questions are not expanded.

Good and bad examples

Write an ethics essay on "Consequences of unethical behavior in "Theranos scandal," which answers the following 5 questions:
1. What in essence is this scandal?
2. What was the root cause of the scandal?
3. What specific NSPE codes of ethics (of fundamental canons) were violated?
4. What were the consequences of the unethical behavior?

Well done 1st paragraph: 50

The Theranos scandal occurred when a blood testing company was found to be lying about the efficiency of its blood pricking technology. With fraud being the root of this scandal, it violated NSPE codes of ethics canons one, four, five, and six. Due to this unethical behavior, the consequences were the company being shut down and the CEO sentenced to prison.

Good and bad examples

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50 Good 1st paragraph (but a little wordy)

The Theranos scandal revolved around the company's false claims regarding its revolutionary blood-testing technology. Elizabeth Holmes, CEO and Stanford dropout, fueled the notion that a few drops of blood could yield comprehensive diagnostic results, a premise that proved to have no scientific backing. The root cause of the scandal lay in the deliberate fabrication of technology capabilities, leading to defrauding investors and patients alike. Fundamental canons of the NSPE code, particularly Canon 1 and Canon 4, were breached, as truthfulness in professional dealings and safeguarding public health were neglected. The consequences were severe, resulting in legal action, financial losses for investors, and eroding

Good and bad examples

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theranos

What is the root cause? You should have summarily answer all questions in the 1st paragraph.

Ethics Essay Assignment

20

The Theranos scandal demonstrates a pertinent example of the substantial consequences that unethical behavior can have on individuals and businesses. In addition to the drastic effects, it can have on the field of biomedical engineering, and engineering as a whole. This essay will explore the Theranos scandal's root causes, specific NSPE (National Society of Professional Engineers) codes of ethics violated, the consequences of the facetious behavior, and explore alternate appropriate behaviors that should have been done in place of the malpractice.

The Theranos scandal is centered around the fraudulent practices of Theranos, a health technology company founded by Elizabeth Holmes. The company was founded on alleging to have developed a revolutionary blood-testing technology that could perform a variety of tests using only a few drops of blood. However, investigations revealed that the technology was less advanced and capable than they claimed. The technology provided false and unreliable test

Ethics Essay Assignment - Recap

- "Consequences of unethical behavior - Takata airbag scandal"
- Individual Assignment
- **Mandatory** Video Tutorial on **How to write technical essay well (mandatory):** Link
- **Format**
  - First paragraph ("Abstract") – Should answer all the questions summarily.
  - Main body – Expanded description on the answers. [Main Body] > 4 * [First Paragraph]
  - Submission File Naming: **Ethics_LastName.docx** (no pdf format)
- **Due:** Check the accompanying Essay Assignment for more details

Grading & Surprise Award

- Grading criteria
  - (x) Entire Report Score : 50 pts
  - (y) 1st Paragraph Score: 50 pts
  - (z) Similarity Score: [0 – 100]
  - **Final Score**: (x + y – (z - 5)
    - <5% of similarity score is OK
- READ the assignment VERY carefully for
  - Scoring rubric
  - **Surprise Award**
- Surprise Award
  - One essay, among those with perfect score, which has fewest words in the 1st paragraph
  - Award: a surprise