

ECE 290 Engineering Profession, Ethics and Law  
MIDTERM EXAMINATION  
2012-10-27T08:30:00P1H20M  
Rooms: DC-1350

Instructions:

There are 53 marks. It will be marked out of 50.

No aides.

Turn off all electronic media and store them under your desk.

If there is insufficient room, use the back of the previous page.

You may ask only two questions during the examination:

“May I go to the washroom?” and “May I have another notebook.”

Asking **any** other question **will** result in a deduction of 5 marks from the exam grade.

All questions should be answered in this examination paper except those where you are directed to answer your questions in the examination notebook that is provided. A question that is not answered in the appropriate place will receive a grade of 0. Any questions answered in the notebook must have the number of the question next to it, otherwise, it will be assigned a grade of 0.

If you think a question is ambiguous, write down your assumptions and continue.

**Do not leave during the examination period.**

Do not stand up until all exams have been picked up.

If a question asks for an answer, you do not have to show your work to get full marks; however, if your answer is wrong and no rough work is presented to show your steps, no part marks will be awarded.

Attention:

The questions are in the order of the course material, not in order of difficulty.

THIS BLOCK MUST BE COMPLETED USING ALL CAPITAL LETTERS IN PEN

|                           |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Surname/Last Name         |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                           |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Legal Given/First Name(s) |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                           |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| UW Student ID Number      | 2 | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| UW User ID                |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

I have read the above instructions:

Signature: \_\_\_\_\_

Asking Any Question  
other than those  
Questions noted  
above.

-5

### Using the Operating System

1. [4] Define self-regulation with respect to the engineering profession in Ontario, and explain how public confidence is essential to the continuation of self-regulation and what may happen if that confidence is lost.

2. [4] An engineer seals a document by stamping a copy of the document with his or her seal and then adding two items. What are the two items?

Why should an engineer seal and distribute only copies of a document and not the original?

3. [2] Bre-X was an example where prospectors in Indonesia managed to manipulate the size of a claim through fraud. What was the result of this event with respect to geologists and geoscientists in Ontario?

4. [2] With respect to regulating the profession of professional engineering, what two mechanisms does the association have to deal with breeches of the Professional Engineering Act with respect to practitioners and other people of the public?

\_\_\_\_\_ and \_\_\_\_\_, respectively.

5. [2] The Microsoft Certified Software Engineer is a designation that can be held by someone who has passed a one-year program accredited by Microsoft. Why would this confusion be unacceptable to students who have graduated from the University of Waterloo software or computer engineering programs, worked for three more years, and then written the Professional Practice Examination to get their licences?

6. [4] The following is an excerpt from the publication of Professional Engineers Ontario describing the case where an engineering student plagiarized during his work-term. You should be aware of the incident and, having read it, give short answers answer the questions that follow.

A Panel of the Discipline Committee of the Association of Professional Engineers of Ontario (PEO) met in the offices of PEO on January 6, 2003, to hear allegations of incompetence and professional misconduct against several professional engineers (the members), who were members of PEO, and allegations of professional misconduct against Company X, a holder of a Certificate of Authorization issued by PEO. The principal allegations, as stated in the Notice of Hearing, dated May 24, 2002, against the members and company X were as follows:

**Allegations**

1. The members and company X issued copies of a catalogue utilizing specific text and figures, which were taken from another company's catalogue without consent from the other company.
2. The catalogue implied that the members and company X were responsible for the product.
3. Company X was selling the product described in the catalogue without complying with the requirements of the Energy Efficiency Act.

Counsel for PEO advised that PEO was seeking leave of the Discipline Panel to withdraw the allegation of incompetence made against the members. Counsel for PEO advised that PEO was not calling any expert or other evidence with respect to the allegations as set out in the Notice of Hearing except for filing the other company's catalogue and the company X catalogue as exhibits.

The members and company X admitted the principal allegations as set out above. The panel conducted a plea inquiry and was satisfied that the admission by the members and company X was *voluntary, informed and unequivocal*.

Why does this document make no reference what-so-ever to the University of Waterloo co-op student who created the catalogue and copied the images and text?

Why was the name of the company and the names of the professional engineers involved not reported?

7. [3] Two legal documents are of specific interest to engineers: the Professional Engineers Act and Ontario Regulation 941.

Who is responsible for the content of each of these documents, respectively?

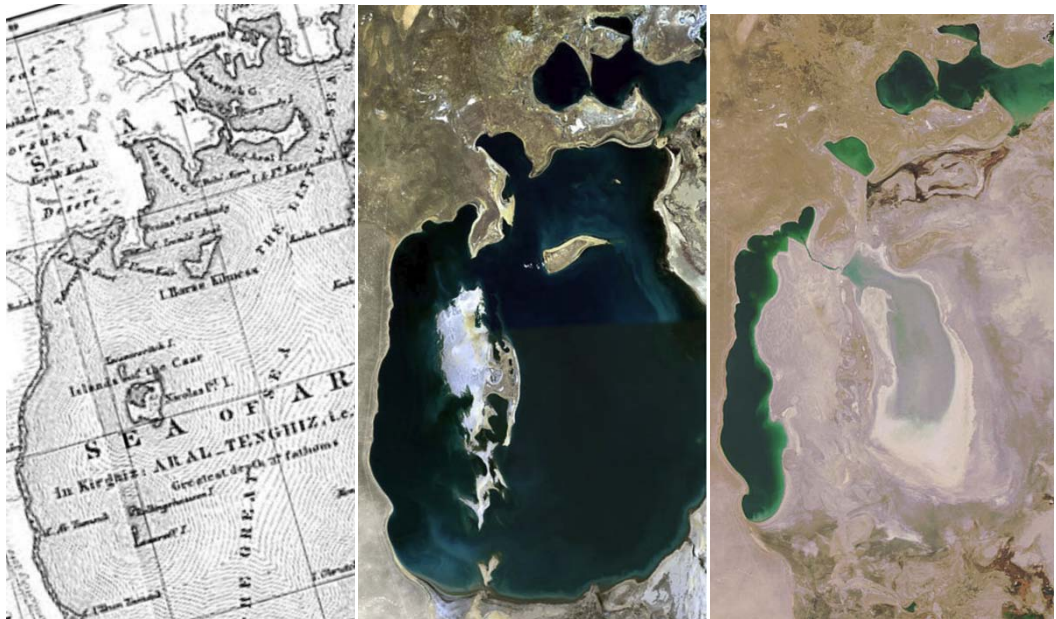
\_\_\_\_\_ and \_\_\_\_\_

Which document describes the scope of the contents of the other?

\_\_\_\_\_

8. [2] Ethics is determining what is \_\_\_\_\_ versus justice which is about determining what is \_\_\_\_\_ .
9. [3] **In your notebook**, define utilitarianism and briefly discuss how this is in opposition to deontology with respect to the evaluation of actions, behaviours, characteristics, and desires of individuals.
10. [4] Bentham described a number of criteria or metrics by which *happiness* could be measures. List four of them here.
11. [3] Describe John Rawls's thought experiment of the *original position* and the associated *veil of ignorance*. Why should a veil of ignorance be used when determining a framework for society?
12. [2] Briefly, what are the two possible exemptions that may allow for differences in society with respect to either social standing or economic benefit according to the *difference principle* associated with the work of John Rawls.

13. [3] The following are three images of the landlocked Aral Sea from a map from the 1800s, from 1989 at the break-up of the Soviet Union, and in 2008. The Aral Sea lies on the border of Kazakhstan and Uzbekistan and the rivers that feed into the sea pass through Turkmenistan, Tajikistan, and Kyrgyzstan (all countries in central Asia). In your notebook, explain how this modern day example parallels the story of the *tragedy of the commons* by identifying three common elements between the two scenarios.



14. [4] You are a professional engineer at *Specific Engines*, a car manufacturing company. You have just released a new car, the *Shiva Curve-Air*. Being a high-end car, the dashboard (the panels behind the steering wheel) has a lot of chrome (a shiny reflecting metallic surface). After analyzing a number of serious accidents (approximately one quarter of which involved the deaths of the driver, passengers, or other individuals), one of your colleagues working in the design department determined that an almost certain cause of these accidents was sunlight reflecting off of specific concave surfaces on the dashboard temporarily blinding the driver. It appears that this issue has been discussed internally, but there was no follow up—there is no intention to *cheapen* the look of the car. Being a professional engineer and understanding the importance of clause 77.2.i, what steps would you follow? Briefly list, in the correct order, the four individuals or groups you would contact before going public and *blowing the whistle*. You may wish to refer to the appropriate points raised in the Code of Ethics 77.3, 77.7, and 77.8.

15. [2] Under the Ontario Occupational Health and Safety Act, worker has the right to refuse work if \_\_\_\_\_?
16. [2] If you ignored the Ontario Occupational Health and Safety Act at your workplace, under which clause of the definition of professional misconduct could you be charged?

17. [8] One major factor in global warming is the increased presence of carbon dioxide in the atmosphere.

A recent unauthorized experiment has been held off the west coast of Canada: a “scientist” seeded the Pacific Ocean with tonnes of iron sulfide. Because iron readily rusts in the oceans, it is often the limiting resource in the growth of algae, a water-living species that uses photosynthesis with carbon dioxide and water which is converted to sugar and oxygen. This increase in iron results in an *algae bloom* which will soon die and descend to the depths of the ocean carrying with it all the carbon that was extracted from the atmosphere. The algae bloom for this particular example covered 10,000 km<sup>2</sup>.

This is a possible example of *carbon sequestration*—taking carbon dioxide out of the atmosphere and, in this case, sending it to the bottom of the ocean. The full consequences of such actions are not understood, but side effects include the death of almost all other large oceanic life and the resulting pollution. The benefit is that the company performing the operation may receive *carbon credits* which it may then sell to allow other companies to offset penalties they incur by introducing carbon dioxide into the atmosphere.

**In your notebook**, write an essay, use ethics to discuss whether or not the oceans should be used in such a way so as to become a tool for reducing the carbon footprint of corporations. You should use both deontology and Kant’s categorical imperatives and utilitarianism.

For deontology, you must state what type of action you believe corporations should follow with respect to using the oceans to reduce their carbon footprint. You must come up with one or more universal laws according to the imperative “act only according to that maxim whereby you can at the same time will that it should become a universal law without contradiction” and then you must determine whether or not this experiment and this type of carbon sequestration satisfies the conditions of your law. (You may have to come up with a universal law related to the experiment, and a universal law related to this type of carbon sequestration.)

For utilitarianism, you must state what you define to be *happiness* and you must justify your definitions. Following this, you must argue as to whether or not the experiment and this type of carbon sequestration increases or decreases happiness that you have defined. If you conclude that the actions increase happiness, then you will conclude the actions are ethical; whereas if you conclude that the actions decrease happiness, you will conclude that the actions were not ethical. Again, you may come to different ethical conclusions for both the experiment and the type of carbon sequestration.

You may, if you wish, compare this example of carbon sequestration with the practice of injecting carbon dioxide into emptied natural gas mines. Other means of carbon sequestration include burying charcoal, and using chemical processes to remove carbon dioxide from the atmosphere.

The length of your essay may vary: you will be marked based on your arguments; however, it should not exceed two pages double spaced. Your introduction and conclusion need be only two or three lines indicating what you will discuss, and what you have discussed, respectively.

77. The following is the Code of Ethics of the Association:

1. It is the duty of a practitioner to the public, to the practitioner's employer, to the practitioner's clients, to other members of the practitioner's profession, and to the practitioner to act at all times with,
  - i. fairness and loyalty to the practitioner's associates, employers, clients, subordinates and employees,
  - ii. fidelity to public needs,
  - iii. devotion to high ideals of personal honour and professional integrity,
  - iv. knowledge of developments in the area of professional engineering relevant to any services that are undertaken, and
  - v. competence in the performance of any professional engineering services that are undertaken.
2. A practitioner shall,
  - i. regard the practitioner's duty to public welfare as paramount,
  - ii. endeavour at all times to enhance the public regard for the practitioner's profession by extending the public knowledge thereof and discouraging untrue, unfair or exaggerated statements with respect to professional engineering,
  - iii. not express publicly, or while the practitioner is serving as a witness before a court, commission or other tribunal, opinions on professional engineering matters that are not founded on adequate knowledge and honest conviction,
  - iv. endeavour to keep the practitioner's licence, temporary licence, provisional licence, limited licence or certificate of authorization, as the case may be, permanently displayed in the practitioner's place of business.
3. A practitioner shall act in professional engineering matters for each employer as a faithful agent or trustee and shall regard as confidential information obtained by the practitioner as to the business affairs, technical methods or processes of an employer and avoid or disclose a conflict of interest that might influence the practitioner's actions or judgment.
4. A practitioner must disclose immediately to the practitioner's client any interest, direct or indirect, that might be construed as prejudicial in any way to the professional judgment of the practitioner in rendering service to the client.
5. A practitioner who is an employee-engineer and is contracting in the practitioner's own name to perform professional engineering work for other than the practitioner's employer, must provide the practitioner's client with a written statement of the nature of the practitioner's status as an employee and the attendant limitations on the practitioner's services to the client, must satisfy the practitioner that the work will not conflict with the practitioner's duty to the practitioner's employer, and must inform the practitioner's employer of the work.
6. A practitioner must co-operate in working with other professionals engaged on a project.
7. A practitioner shall,
  - i. act towards other practitioners with courtesy and good faith,
  - ii. not accept an engagement to review the work of another practitioner for the same employer except with the knowledge of the other practitioner or except where the connection of the other practitioner with the work has been terminated,
  - iii. not maliciously injure the reputation or business of another practitioner,
  - iv. not attempt to gain an advantage over other practitioners by paying or accepting a commission in securing professional engineering work, and
  - v. give proper credit for engineering work, uphold the principle of adequate compensation for engineering work, provide opportunity for professional development and advancement of the practitioner's associates and subordinates, and extend the effectiveness of the profession through the interchange of engineering information and experience.
8. A practitioner shall maintain the honour and integrity of the practitioner's profession and without fear or favour expose before the proper tribunals unprofessional, dishonest or unethical conduct by any other practitioner.

72. (1) In this section,

“harassment” means engaging in a course of vexatious comment or conduct that is known or ought reasonably to be known as unwelcome and that might reasonably be regarded as interfering in a professional engineering relationship;

“negligence” means an act or an omission in the carrying out of the work of a practitioner that constitutes a failure to maintain the standards that a reasonable and prudent practitioner would maintain in the circumstances.

(2) For the purposes of the Act and this Regulation, “professional misconduct” means,

- (a) negligence,
- (b) failure to make reasonable provision for the safeguarding of life, health or property of a person who may be affected by the work for which the practitioner is responsible,
- (c) failure to act to correct or report a situation that the practitioner believes may endanger the safety or the welfare of the public,
- (d) failure to make responsible provision for complying with applicable statutes, regulations, standards, codes, by-laws and rules in connection with work being undertaken by or under the responsibility of the practitioner,
- (e) signing or sealing a final drawing, specification, plan, report or other document not actually prepared or checked by the practitioner,
- (f) failure of a practitioner to present clearly to the practitioner’s employer the consequences to be expected from a deviation proposed in work, if the professional engineering judgment of the practitioner is overruled by non-technical authority in cases where the practitioner is responsible for the technical adequacy of professional engineering work,
- (g) breach of the Act or regulations, other than an action that is solely a breach of the code of ethics,
- (h) undertaking work the practitioner is not competent to perform by virtue of the practitioner’s training and experience,
- (i) failure to make prompt, voluntary and complete disclosure of an interest, direct or indirect, that might in any way be, or be construed as, prejudicial to the professional judgment of the practitioner in rendering service to the public, to an employer or to a client, and in particular, without limiting the generality of the foregoing, carrying out any of the following acts without making such a prior disclosure:
  - 1. Accepting compensation in any form for a particular service from more than one party.
  - 2. Submitting a tender or acting as a contractor in respect of work upon which the practitioner may be performing as a professional engineer.
  - 3. Participating in the supply of material or equipment to be used by the employer or client of the practitioner.
  - 4. Contracting in the practitioner’s own right to perform professional engineering services for other than the practitioner’s employer.
  - 5. Expressing opinions or making statements concerning matters within the practice of professional engineering of public interest where the opinions or statements are inspired or paid for by other interests,
- (j) conduct or an act relevant to the practice of professional engineering that, having regard to all the circumstances, would reasonably be regarded by the engineering profession as disgraceful, dishonourable or unprofessional,
- (k) failure by a practitioner to abide by the terms, conditions or limitations of the practitioner’s licence, provisional licence, limited licence, temporary licence or certificate,
- (l) failure to supply documents or information requested by an investigator acting under section 33 of the Act,
- (m) permitting, counselling or assisting a person who is not a practitioner to engage in the practice of professional engineering except as provided for in the Act or the regulations,
- (n) harassment.