

APS100 Final review

Kailin Liu

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1.0 Academic and Learning skills

1.1 SMART goal

Specific: Well defined and clear. (include 5 “W” questions) 强调细节

- *Who*: Who is involved in this goal?
- *What*: What do I want to accomplish?
- *Where*: Where is this goal to be achieved?
- *When*: When do I want to achieve this goal?
- *Why*: Why do I want to achieve this goal?

Measurable: A SMART goal must-have criteria for measuring progress. 制定可衡量的目标

If there are no criteria, you will not be able to determine your progress and if you are on track to reach your goal. 没有标准--无法确定是否进步--无法确定是否在实现目标的轨道上

- 数量 How many/much?
- 是否达成目标的测量 How do I know if I have reached my goal?
- 进度提示 What is my indicator of progress?

Achievable: 这个目标必须是是可以实现的

- resources and capabilities to achieve the goal *OR* what's 'missing
- Have others done it successfully before

Realistic: A SMART goal must be realistic in that the goal can be realistically achieved given the available resources and time.

- realistic and within reach
- reachable, given the time and resources
- able to commit to achieving the goal

Timely: SMART goal must be time-bound in that it has a *start and finish date*.

- have a deadline
- By when to achieve your goal

<https://corporatefinanceinstitute.com/resources/knowledge/other/smart-goal/>

1.2 Time management (including procrastination)

- Time management—Effective scheduling
通过SMART Goals来制作weely schedule
- Time management skills (sample questions)
 1. Why are *time management skills* important?
keywords: productive, effective, meet deadlines, save time
 2. Were there any *time management tools*?
paper/electrical calendar, Days Matter App...

1.3 Stress management techniques

- well being (you are resilient)

1. feeling good
 2. functioning well
- Five ways to wellbeing
 1. *Connect* – talk & listen; be there; feel connected (social network)
 2. *Be active* – enjoy what you do; move your mood
 3. *Keep learning* – seek opportunities; embrace new experiences (try sth new)
 4. *Take notice* – notice simple things that bring you joy (be curious)
 5. *Give* – time, words, presence (sth nice to the stranger or friends)

1.4 Learning strategies

- **CEAB** (Canadian engineering accreditation board)
- 2 most effective learning strategies:

Practice Testing: (考试前疯狂刷题)

It consists of studying and reviewing by answering questions and actively bringing information back to mind. When this is done, information is reconsolidated, new connections are created, and memory and understanding are strengthened.

Distributed practice: (每天学一点比考前临阵磨枪更有效)

Distributed practice is basically the opposite of cramming. Research consistently shows that studying small chunks of content spread out over time is more effective than studying long blocks of the same topic only once.

<https://senecalearning.com/en-GB/blog/top-10-most-effective-learning-strategies/>

1.5 Problem-solving (using concepts of mathematics and sciences)

- Polya's problem-solving method
 1. Understanding the problem
 - Unknowns (Goal)
 - provided relevant info (knowns)
 - Conditions&relevant principles (foundations)
 - Diagram (visualisation)
 2. Devising a plan
 - Connection between provided info and the unknown
 - Restate the question in a more useful manner
 - Consider the related problem (use its method or answer)
 3. Carrying out the plan
 - Check (prove if it's correct)
 4. Looking back
 - Check the result&solution
 - Answer is complete or not&directly solve the problem or not

Modified McMaster Problem Solving Approach

I can	Address any anxiety (e.g., use the breathing exercise)
• Develop your self-confidence and belief in yourself	
Define	List knowns and unknowns
• Restate the problem in your own words • Sketch a figure to help visualize the problem • Draw a block diagram – <i>How do you plan to connect the knowns to the unknown?</i>	
Explore	“Think about it” or “Ponder”
• What kind of problem is this? Have I seen something like this before? • What parts of the problem might be “routine”? • What are the foundational elements or concepts of the problem?	
Plan	What is the logic behind your solution? What are the necessary steps?
• A flowchart may be a helpful tool for this step • Often easier for “global learners”, those who are more sequential learners need practice with this step	
Do it	Often this is the step that novice problem solvers start with too quickly
• Monitor your progress as you move through your plan, iterate and change the plan when needed	
Check	“Does your answer make sense?”
• Use simple estimation techniques to test if your answer seems to be reasonable	
Generalize	What have I learned from solving this problem?
• How can I approach this kind of problem differently in the future?	

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1.6 Learning tool(test, quiz, midterm)

- thoughtful review and reflection

2.0 Engineering Community and Co-curricular Opportunities

2.1 Utilize resources (prof, TA, advisors, peers)

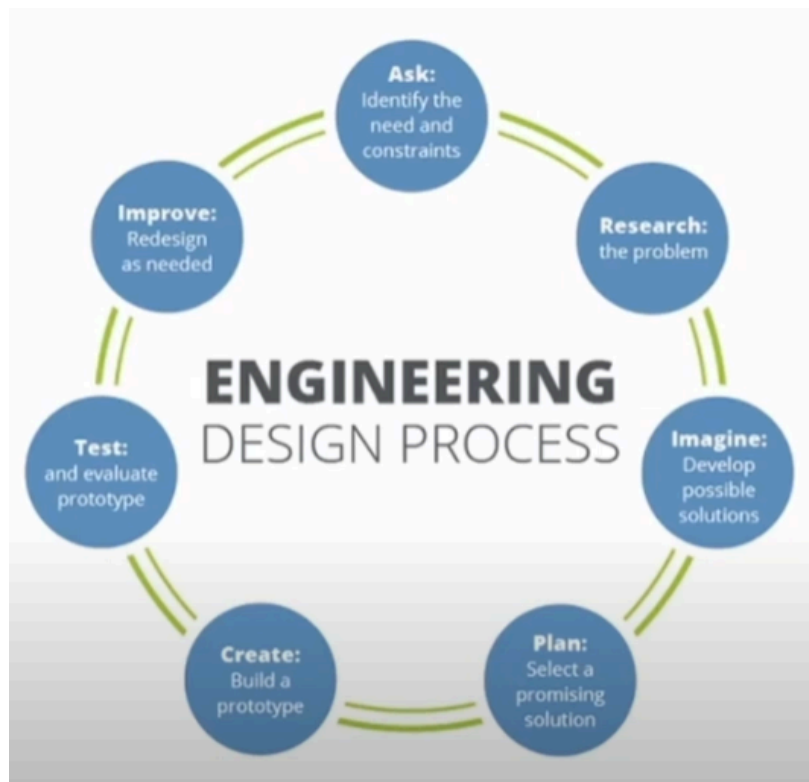
2.2 Academic success

- Thriving students
 1. are engaged in the learning process
 2. manage their time effectively
 3. are committed to making a meaningful difference in the world
 4. invest the effort to reach their goals
 5. connect with other people
 6. are optimistic about their future
- Five Factors of Thriving
 1. Engaged Learning
 2. Diverse Citizenship
 3. Social Connectedness
 4. Positive Perspective
 5. Engaged Learning
- Deliberate decision making throughout professional and academic life
 1. *In design*: making collaborative decisions in teams
 2. *In team*: Deciding how to design your teamwork
 3. *In communication*: Deciding how to communicate
 4. *In thriving*: Deciding what means “to thrive”

2.3 Success for Engineering designer

“Social + technical” [Intersectionality & positionality]

- Engineers as people (self-reflection)
 “How does who you are influence your view of the world?”
 1. Why do I want to be an engineer
 2. Why do I want to benefit from my work
 3. What do I believe is my social responsibility as an engineer
- Engineering with people (the power of a brave space)
 “Engineering teams often consist of people with different experiences and perspectives; This diversity (experience, identity, cognitive) often leads to better outcomes for complex tasks.”
 1. Controversy with civility 争议文明
 2. Owning intentions and impacts 拥有意图与影响
 3. Challenge by choice 选择性的挑战
 4. Respect 尊重
 5. No attacks 没有攻击
- Engineering for people (the power of empathy)
 “Stakeholders (groups of people invested, impacted or can influence a project) are always in the engineering design process; Exists varying needs and desires of stakeholders based on their context, experience etc..”
 1. *Empathy* 共情 – the ability to sense other people’s emotions 换位思考
 2. Important when designing for others since remember it is they who will be impacted by your design.
- George Catalano’s framework for engineering in a morally deep world
 1. Via positiva – what is to be solved? for whom is it to be solved?
 2. Via negativa – what are ethical considerations? Societal? Global environment?
 3. Via creative – have all creative and critical thinking skills been employed?
 4. Via transformativa – has the suffering/injustice in the world been reduced?
- Engineering design process (cycle)



2.4 Career pathways available to engineering students

- Engineering career center (PEY co-op)

2.5 Engineering leadership

- What is leadership

“Leadership is a process that begins with self and guided by values, vision, vitality, inspires, empowers and influences others, teams, and organizations to make positive change.”

1. Leadership *can be learned* 可被学习
2. Leadership is a process of *refining and enacting values, mindsets, and behaviors, not a position* 一种..的过程, 不是一个职位
3. Leadership begins with *self-awareness and self-action* 始于自我意识与自我行动
4. *Everyone* is responsible for and has an opportunity to leadership 人人有机会
5. Leadership *empowers engineering* 领导力授权工程

- What is Engineering

“Engineering is a process of applying math, science, technology, and economics to ethically and equitably solve problems for people and the environment through design, analysis, decision making, project management, and influence.”

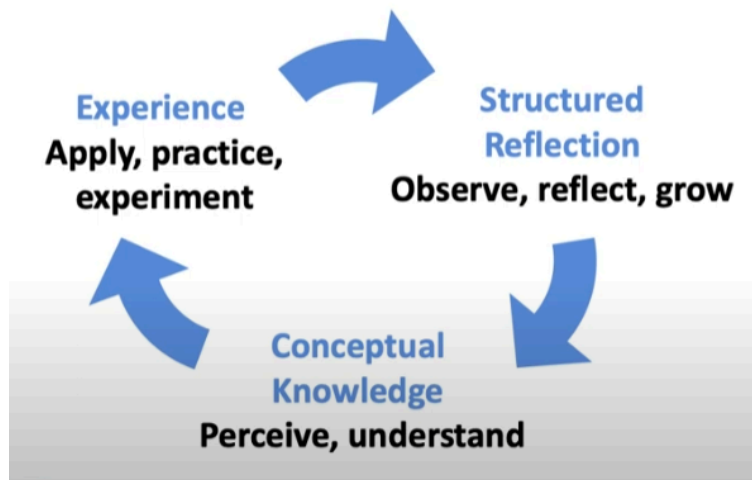
- Engineering Leadership Orientations (three orientations to engineering leadership)

1. *Technical mastery* (technical expertise + mentorship) 技术精通
2. *Collaborative optimization* (process optimization + team catalyst) 协同优化
3. *Organizational innovation* (innovation + realization) 组织创新

- 7 scared teachings

love, respect, courage, honesty, wisdom, humility, truth

- Learning leadership



3.0 Professional Conduct, Equity, Engineering Ethics, and the Engineering Resume

3.1 Academic integrity – case study

“Acting in all academic matters with *honesty, trust, fairness, respect, responsibility, courage.*”

- Academic offenses

1. *Alternating, forging, falsifying* documents other than academic records 变更伪造篡改
2. Possession or use of *unauthorized aids* 授权

3. *Impersonation* 模仿
4. *Plagiarism* – To represent as one’s own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work. 剽窃
5. Submission of work for which credit has previously been obtained 重复提交已评分内容
6. Submission of work containing purported statement(s) of fact or reference(s) to concocted sources 捏造来源
7. Altering, forging or falsifying an academic record 变更伪造篡改学术成绩
8. Any other misconduct to obtain academic credit or advantage 其他不当行为
9. Assisting another student in committing an offense 协助其他学生作弊

3.2 Equity, Equality

- “Diversity is a fact, inclusion is a practice, equity is a goal.”
 1. *Equity* 公平 – fair treatment, access, opportunity, advancement of all individuals.
 2. *Diversity* 差异 ; 多样性 – unique characteristics, perspectives & life experiences that define us as individuals.
 3. *Inclusion* 认同感 ; 归属感 – creating an environment where all individuals contribute fully and feel valued, engaged and supported to reach their full potential.
- Equality vs Equity (Models of Fairness)
 1. *Equality* – an idea of uniformity in treatment or status
 2. *Equity* – describes the acknowledgment of barriers to equal opportunities which exist and vary due to identity/circumstance differences and working to reduce and/or eliminate such barriers.
- Identity, Privilege, Power
 1. *Identity* 身份 – A collection of distinguishing features/characteristics used to define who we are. 定义我们是谁
 2. *Privilege* 特权 – a special right, advantage or immunity granted or available only to a particular person or group of people. 给予少部分人
 3. *Power* 权利 – The ability to intentionally (or unintentionally) influence or outright control the behavior of people. 有意无意的能控制他人行为的能力
- * Discussing concepts of one’s identity, privilege and power.
 The combination of one’s identity, context and associated power/privilege (or lack of thereof) can influence both how society impacts them (intersectionality) and how they perceive the world (positionality). 社会如何影响他们 ; 他们如何感知世界

EDI cases

3.3 Code of Ethics (including PEO and IEEE)

- Definition of ethics:
 “normally correct” “justified” ---在道德上正确, 关于义务、权利和理想的合理的道德准则

- Engineering code of ethics:
 1. Some professional organizations have addressed the complexity of moral issues in their fields by developing codes of ethics. 一些专业组织通过发展道德规范来解决其领域中复杂的道德问题
 2. Professional codes of ethics consist primarily of principles of responsibility that delineate how to promote the public good. 职业道德规范主要由描述如何促进公共利益的责任原则组成。
- Code of Ethics—Professional Engineerings in Ontario
 - The code states that "it is the duty of a practitioner to the public, to the practitioner's employer, to the practitioner's clients, to other licensed engineers of the practitioner's profession, and to the practitioner to act at all times with,
 1. fairness and loyalty to the practitioner's associates, employers, clients, subordinates and employees; 公平&忠诚
 2. fidelity to public needs; 以公众需求(消费者)为核心
 3. devotion to high ideals of personal honor and professional integrity; 致力于个人荣誉和职业道德的崇高理想
 4. knowledge of developments in the area of professional engineering relevant to any services that are undertaken; 提高专业领域知识
 5. competence in the performance of any professional engineering services that are undertaken.

Sample questions: female discrimination 算哪种code of ethics?

- Liability
 1. *Definition*: "Liability"—something you are legally responsible for
 2. The law holds manufacturers, sellers and distributors responsible for products that pose a danger to users or consumers as a result of design and/or manufacturing defects. 法律要求制造商、销售商和分销商对因设计和/或制造缺陷而对用户或消费者构成危险的产品负责
 3. *Types of defects*:
 - Design Defects* – a defect inherent in the design of the product. (Intended)
设计缺陷: 产品设计中固有的缺陷 例如: 一个被设计成三条腿的椅子是不稳的
 - Manufacturing Defects* – unintended defects made during the manufacturing process (Unintended)
制造缺陷——在制造过程中产生的非预期缺陷。
例如: 椅子的三条腿被设计成稳定的, 但其中一条腿没有固定正确。
 - Marketing defects*—defects in the manner in which a product is sold. (Not thinking of foreseeable issues)
营销缺陷——产品销售方式上的缺陷(没有考虑到可预见的问题)
例如: 没有在销售过程中说明如何使用这个三条腿的椅子。

Sample question (以下情况属于哪种defect?)

Q1: 油门踏板卡在地毯上

Q2: 羊毛帽衫和t恤的拉链表面的涂层含铅量超标, 违反了联邦的含铅涂料标准。

Q3: 当两个或更多的磁铁被吞食时, 它们会在孩子的肠道内连接在一起, 夹在身体组织上, 导致肠道阻塞、穿孔、败血症和死亡。

Answers: Q1 design defect; Q2 manufacturing defect; Q3: marketing defect

“Ethics” is best defined as: (e)

- a) A philosophical concept dealing with moral conduct
- b) A set of standards establishing right and wrong answers
- c) Rules that describe your duty to society and to your fellow professionals
- d) Guidelines that help you make decisions
- e) All of the above

- PEO VS IEEE

<i>PEO Code of Ethics</i>	<i>IEEE Code of Ethics</i>
Fairness (1.i.)	Fair treatment (8)
Knowledge of developments (1.iv.)	Maintain and improve our technical competence (6)
Competence in performance (1.v.)	Undertake technological tasks...only if qualified (6)
Public welfare as paramount (2.i.)	Responsibility for safety, health, and welfare of the public (1)
Speak honestly and with adequate knowledge (2.iii.)	Honest and realistic in stating claims (3)
Disclosure of any conflicts of interest (4)	Avoid and disclose any real or perceived conflicts of interest (2)
Not maliciously injure the reputation...(7.iii.)	Avoid injuring others...(9)
Give proper credit (7.v.)	Credit properly the contribution of others (7)

3.4 Engineering Resume

- Working experiences
- Academic experiences
- skills
- languages
- projects
- personal description&contact info

Academic and Learning Skills

By the end of the course you will be able to: (short answer question?)

1. Develop a personalized **study plan** which makes effective use of your time and available resources. 制定一个个性化的学习计划, 有效利用你的时间和资源。(specific google一个)
2. Make use of tests, quizzes, and midterms as a learning tool, through thoughtful review and reflection.
3. Apply **stress management techniques** to manage stress during periods of heavy workload or in the writing of tests and exams. (discussion board)
4. Recall and apply effective **learning strategies** and techniques as understood from recent research.

5. Understand how engineers solve real-world problems using concepts including mathematics and science. (discussion board)

Engineering Community and Co-curricular Opportunities

By the end of this course you will be able to:

6. Identify, locate and understand how to utilize resources such as your professors, teaching assistants, academic advisors, and peers to support your academic journey.

7. Recognize how **extra and co-curricular opportunities**, academic pathways, undergraduate research, and work integrated learning can support your academic success.
(工程面试题)

8. Describe types of **career pathways** available to an engineering student and graduate.

Professional Conduct, Equity, Engineering Ethics, and the Engineering Résumé

By the end of this course you will be able to:

9. **Define academic integrity** and the Student Code of Conduct and recognize how it applies to the first-year course experience. (discussion board)

10. Describe the fundamental principles of equity, equality, and inclusion and incorporate these into your practice as a U of T Engineering student.

11. Describe the **essential elements of ethics** in engineering and professional engineering practice and apply the PEO and IEEE Codes of Ethics to specific scenarios.

先描述ethics到底是什么，在讲elements of ethics in engineering都包含什么
再用code of ethics去判断此case study符合那种情况。

12. Recognize important components of an engineering résumé and develop a personal engineering résumé.