



# United International University

## Department of Computer Science and Engineering

SOC 2101: Society, Environment and Engineering Ethics

Final Exam - Spring2024

Total Marks: 25      Time: 1 hour 30 minutes

**Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.**

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*Answer all the 5 questions. Numbers to the right of the questions denote their marks.*

1. GreenTech Innovations is a well-known software company that specializes in developing advanced environmental monitoring systems. The company is reputed for its employee-centric policies, providing excellent work-life balance, and regularly conducting training programs to keep staff updated with the latest state-of-the-art technologies. GreenTech is also distinguished for its exceptional client support. The company not only delivers cutting-edge software but also prepares detailed documentation and usage guides to further enhance client experience.

Recently, a rural tribal community approached GreenTech to develop a new environmental monitoring system after their previous system became outdated and unsupported. This system was vital for the community, as they depended on it for sustainable agriculture and fishing. However, during the development of this software, GreenTech significantly deviated from their standard practice of closely collaborating with clients to customize solutions, assuming the tribal users had limited software knowledge. The company engaged minimally with the tribal community while developing the initial version. Furthermore, several bugs identified by the community were overlooked as minor issues, despite their potential impact on the community's essential activities.

With a view to quickly deploy the new system, GreenTech accessed historical data from the old system without obtaining explicit authorization from the tribal leaders. Moreover, the old system was deactivated without ensuring that all user data had been successfully migrated to the new system. Furthermore, GreenTech reassigned a skilled front-end developer, who typically focused on UI functionalities, to oversee AI development for the new platform. Due to the sudden nature of this task switch and the nearing of deadlines, the developer struggled to meet the specific needs of the tribal community.

Analyze the scenario described above using the ACM Code of Ethics, stating with reason which of the principles are being followed and which are being violated. [5]

2. Imagine a scenario where a university like UIU, provides interest-free loans to students during times of financial need. Currently, a team manually assesses the eligibility of each student for the loan, which can be time-consuming. The team is considering developing a machine learning-based tool to speed up the initial screening process. The tool will utilize various machine learning models to analyze students' academic performance, financial history, and personal circumstances to predict their likelihood of needing financial assistance.

Reflecting on this situation, consider the potential ethical implications of implementing such a tool. Discuss concerns related to fairness, transparency, and algorithmic bias in determining loan eligibility. Discuss how relying on machine learning algorithms could impact students' access to financial assistance. Additionally, propose strategies to ensure that the machine learning tool operates ethically, respects students' privacy and dignity, and effectively supports those in need of financial assistance. [5]

3. In a project named “**EmoBoost**”, TikTok collaborated with AI experts and psychologists to analyze the behavior of users who frequently engage with content related to mental health challenges, such as anxiety and stress. TikTok quietly monitored the interactions and content consumption patterns of 5,000 users who expressed struggles with mental well-being. Using advanced algorithms, the platform identified the types of content that alleviate stress and promote well-being for these users. Building on this research, TikTok introduced a new “MoodLift” feature in December 2023. Whenever the AI detected a user engaging with content related to mental health challenges, it would intervene by suggesting uplifting videos, meditation exercises, or mental health resources tailored to the user's preferences.

The initial feedback from users was overwhelmingly positive, with many reporting a sense of relief and gratitude for the supportive content provided by TikTok. In a press release, TikTok highlighted the success of the “EmoBoost” project in enhancing user experience and promoting mental well-being on the platform. Reflecting on TikTok's “EmoBoost” project, **what ethical considerations emerge regarding the platform's monitoring of users' mental health-related content and the implementation of AI-driven interventions? How might TikTok ensure transparency, informed consent, and user autonomy while researching and deploying features to support users' mental well-being?** [5]

4. In a small town, there is a new gym where people love to work out. They think it is just a regular place to get fit, but something secret is going on. The gym owners are actually scientists secretly studying how exercise and special drinks affect the human body. They're trying to make people stronger, like a super army! When people lift weights or run on treadmills at the gym, sensors hidden in the equipment track how hard they are working. And when they drink the special drinks provided by the gym, the scientists watch how it changes their energy levels.

But there is a catch. The special drinks might have side effects. Some people feel jittery or have trouble sleeping after drinking them. Others notice strange changes in their mood or appetite. The scientists are keeping a close eye on these side effects, but they are determined to keep their experiments going. All the while, the people working out have no idea they are part of a big experiment. They are just trying to get healthier, but little do they know, they might be helping create super-powered soldiers with some unexpected consequences.

Is the data collection process correct? What necessary steps should be taken? Explain.

[5]

5. In 2024, a consortium of technology companies, urban planners, and environmentalists launched a "Smart City" initiative in a major metropolitan area. The initiative aims to integrate advanced IoT devices, AI-driven analytics, and sustainable energy solutions to enhance urban living. Key features of the smart city include autonomous public transport, energy-efficient buildings, and a comprehensive waste management system that uses AI to optimize recycling processes. While the project promises significant improvements in energy efficiency and reduced carbon footprints, concerns have been raised regarding the environmental costs of implementing such technologies. Critics argue that these high-tech systems' production, maintenance, and eventual disposal could offset the potential environmental benefits. They point to the extensive use of rare earth metals, the increased electronic waste from outdated systems, and the potential for these technologies to contribute to a larger digital divide in urban areas.

Analyze the environmental impacts of these Smart City technologies, both positive and negative, considering their entire lifecycle. Propose strategies to reduce negative impacts and enhance positive effects.

[5]