Review of the Project Group:
Group Code: 11
Full title: Design, operation and safety features of NuScale

Intended learning outcome (ILO)	Grade (0-3)	Explanation for the grading of the evidences of achieving respective ILO. Suggestions for improvements and other comments
1. *Collect information on* General design specification of the nuclear power plant with selected reactor type (Task 1, ILO1, ILO2)	3	For ILO1, the work included a general description of the NuScale reactor, as well as a detailed explanation of the reactor vessels primary and secondary loop. The data presented in the work were effectively summarized in tables and figures and well-explained in the text. The work also focused on specific details of the NuScale reactor, including its modularity, the number of power modules, and the construction delay of only 36 months. Additionally, the work provided a lot of technical details such as the type of stainless steel used.
2. *Describe* Operational principles of the power plant. (Task 2, ILO1, ILO2)	3	For ILO1, a detailed explanation was provided for the auxiliary systems, specifically the Cooling water system and Feedwater systems. The explanation was thorough and provided clear understanding of the systems. For ILO2, the operations were described in chronological order and the methods for reactivity control, including control rods and CVCS, were well discussed. However, the feedback suggests that more emphasis could have been placed on the difference between based load scenario and load following scenario. The work also detailed the passive system used to remove residual heat, which is a unique feature of the NuScale reactor.
3. *Explain* Safety features of the power plant. (Task 3, ILO1, ILO2)	3	For ILO1, the work provides a detailed explanation of several systems of the NuScale reactor, including the Emergency Core Cooling Systems, Ultimate Heat Sink, Reactor Building, and the fact that NuScale reactors are underground. This comprehensive description effectively explains the functioning and unique features of the NuScale reactor. For ILO2, the work provides a thorough explanation of the safety features of the NuScale reactor, such as the removal of air to create vacuum insulation and the high-pressure design of the vessels. The work also identifies a major risk associated with the failure of the hydraulic ECCS, demonstrating an understanding of potential safety issues. In addition, the inclusion of a sequence for computing the probability risk using Saphire and Melcor coding further highlights the importance of safety in the NuScale reactor.
4. *Calculate* Selected core parameters (Task 4, ILO3)	3	The work appears to have effectively achieved ILO3 by providing a comprehensive explanation of input data, correlations used, and justifications for the calculations. The pressure drop is appropriately considered, with 5 local losses due to spacers. The distribution of coolant and temperature is also well explained, and the use of xsteam for each cell to calculate Cpk adds to the accuracy of the results. Additionally, the choice of a two-phase flow model for the flow characteristics further demonstrates a thorough understanding of the topic.
5. *Calculate* CHF margins in a hot channel (Task 5,	2.5	For ILO4a), the study appears to have effectively simulated hot spots and considered the associated factors such as the increase

ILO4a)		in enthalpy and coolant temperature, as well as the presence of voids in hot channels. However, it may have been beneficial to include a comparison of hot channel and classic channel calculations on the same graph for easier analysis. Additionally, you could have considered redoing the calculations with a lower peaking factor since the criticality margin has already been reached and there are voids present, which would likely affect the accuracy of the DNBR value. Nevertheless, the results provided appear to be accurate and indicate a strong understanding of the of the objectives ILO4a).
6. *Calculate* Maximum cladding and fuel pellet temperature (Task 6, ILO4b)	3	For ILO4b), the study was able to determine the maximum cladding temperature (657 K) and fuel pellet temperature (1150 K) through their calculations. Although the fuel pellet temperature value obtained is not what was expected, the student provided a reasonable explanation for it. Additionally, the report performed a comparison to the melting temperature for safety purposes.