

***Course Scheduling Optimization Using the Welch-Powell Algorithm  
in the Informatics Engineering Study Program of Polije Sidoarjo***

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***ABSTRACT***

*Course scheduling is a crucial organizational process in managing academic activities at higher education institutions, as it involves allocating time, rooms, and teaching staff to ensure all lectures can proceed without scheduling conflicts. At the Informatics Engineering Study Program of PSDKU Politeknik Negeri Jember (Polije) Sidoarjo Campus, the scheduling process is still carried out manually by study program administrators. This manual approach is prone to errors, time-consuming, and risks generating scheduling conflicts because it must simultaneously consider numerous variables, including lecturer availability, credit hours (SKS), classroom capacity, and the distribution of lecture days and time slots.*

*This study aims to develop a web-based course scheduling system by implementing the Welch-Powell Algorithm. This algorithm leverages the concept of graph coloring, wherein each course is represented as a node and conflicts between courses as connecting edges. The nodes are then sorted in descending order of their degree and systematically assigned colors (time slots), with the rule that no two adjacent nodes may share the same color. The system was developed using the Software Development Life Cycle (SDLC) Waterfall model with web-based technology (PHP and MySQL), making it accessible at any time through a browser. The interface was designed to be simple and functional, enabling administrators to efficiently manage master data including lecturers, courses, classrooms, credit hours, and lecture time slots.*

*System evaluation was conducted through two testing stages. Functional testing using the Black Box Testing method confirmed that all system features operate as intended. Usability testing using the System Usability Scale (SUS) yielded a score of 70, falling within the Acceptable category. Therefore, the course scheduling system based on the Welch-Powell Algorithm is proven capable of automatically generating conflict-free lecture schedules, faster and more structured compared to the previous manual method, and is feasible to be implemented as an academic scheduling solution for the Informatics Engineering Study Program at Polije Sidoarjo Campus.*

**Keywords:** *Course Scheduling, Welch-Powell Algorithm, Graph Coloring, System Usability Scale, Waterfall.*