# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

| | |
|---|---|
| 2) A Sudoku Puzzle Solver using both the Backtracking Algorithm AND the Cultural Algorithm. | ☐ |
| 3) Knight's Tour Problem Solver (for different sizes – n should be selected by the user) using the Backtracking Search Algorithm, AND the Cultural Algorithm. | ☐ |
| 7) Bin Packing Problem Solver using the Backtracking Search Algorithm, AND a Cultural Algorithm. | ☐ |
| 8) Graph Colouring Problem Solver using the Backtracking Search Algorithm, AND the Cultural Algorithm. | ☐ |
| 9) KenKen (KenDoku) Puzzle Solver using the Backtracking Search Algorithm, AND a Cultural Algorithm. | ☐ |
| 10) Job Scheduling Problem Solver using the Backtracking Search Algorithm, AND a Cultural Algorithm. | ☐ |

**Team Information** ***(typed, not handwritten, except for the attendance signature)*****:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| Item | Mark | Team Members | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 4 | | | | | | |
| Representation of the States, Actions, and the State Space | 4 | | | | | | |
| Application of Backtracking Algorithm | 4 | | | | | | |
| Design of the Encoding and the Fitness Function (and the belief space) | 3 | | | | | | |
| Application of Cultural Algorithm (including a plot of CA performance across the generations) | 7 | | | | | | |
| Discussion & Analysis of Results – including the effects of parents' selection approaches, crossover approaches, mutation approaches, population sizes, belief-space parameters, and survivors' selection approaches & elitism. | 4 | | | | | | |
| Implementation | 9 | | | | | | |
| GUI (deduct 3 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 5 marks | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate | | | | | | | |
| Total | 35 | | | | | | |

# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

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| 1) N-Queens Problem Solver (for different sizes – n should be selected by the user) using the Backtracking Search Algorithm, a Best-First Search, a Hill-Climbing Search, AND a Cultural Algorithm. | ☐ |

**Team Information** ***(typed, not handwritten, except for the attendance signature)*****:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| Item | Mark | Team Members | | | | | |
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| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 3 | | | | | | |
| Representation of the States, Actions, and the State Space | 3 | | | | | | |
| Application of Backtracking Algorithm | 3 | | | | | | |
| Design of Heuristic Functions 1 & 2 | 3 | | | | | | |
| Application of the Best First Algorithm | 4 | | | | | | |
| Application of the Hill-Climbing Search Algorithm | 3 | | | | | | |
| Application of Cultural Algorithm (including a plot of CA performance across the generations, the belief space, and the design of the fitness function) | 5 | | | | | | |
| Discussion & Analysis of Results – including the effects of the different heuristic functions, parents' selection approaches, crossover approaches, mutation approaches, population sizes, belief-space parameters, and survivors' selection approaches & elitism. | 4 | | | | | | |
| Implementation | 7 | | | | | | |
| GUI (deduct 4 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 6 marks | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate | | | | | | | |
| Total | 35 | | | | | | |

# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

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|---|---|
| 4) An Intelligent Cubic Player using the Minimax Algorithm, Alpha-Beta Pruning, and Heuristic Functions. | ☐ |
| 5) An Intelligent Connect-6 Player using the Minimax Algorithm, Alpha-Beta Pruning, and Heuristic Functions. | ☐ |
| 6) An Intelligent Gomoku Player using the Minimax Algorithm, Alpha-Beta Pruning, and Heuristic Functions. | ☐ |
| 11) An Intelligent Pente Player using the Minimax Algorithm, Alpha-Beta Pruning, and Heuristic Functions. | ☐ |

**Team Information *(typed, not handwritten, except for the attendance signature)*:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| Item | Mark | Team Members | | | | | |
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| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 3 | | | | | | |
| Representation of the States, Actions, and the State Space | 3 | | | | | | |
| Design of Heuristic Function 1 | 3 | | | | | | |
| Design of Heuristic Function 2 | 3 | | | | | | |
| Application of the MiniMax Algorithm using Heuristic 1 | 3 | | | | | | |
| Application of the MiniMax Algorithm using Heuristic 2 | 3 | | | | | | |
| Pruning the MiniMax Search using Alpha-Beta Approach (once for each Heuristic) | 5 | | | | | | |
| Discussion & Analysis of Results – including the effects of the different heuristic functions, and the alpha-beta pruning. | 4 | | | | | | |
| Implementation | 8 | | | | | | |
| GUI (deduct 4 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 6 marks. | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate. | | | | | | | |
| Total | 35 | | | | | | |

# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

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|---|---|
| 12) Sports Tournament Scheduling via Genetic Algorithms (GA). | ☐ |
| 13) Solving a Faculty's Timetable Scheduling Problem using the Cultural Algorithm. | ☐ |
| 14) Cloud Resource Allocation using the Genetic Algorithm (GA). | ☐ |
| 15) Solving the Knapsack Problem using a Cultural Algorithm (Solve both the 0-1 Knapsack Problem and the Unbounded Knapsack Problem). | ☐ |

**Team Information** ***(typed, not handwritten, except for the attendance signature)*****:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 5 | | | | | | |
| Design of the Encoding and the Fitness Function (and the belief space in case of CA) | 8 | | | | | | |
| Application of the Algorithm "GA or CA" (including a plot of the performance across the generations for each setting) | 8 | | | | | | |
| Discussion & Analysis of Results – including the effects of parents' selection approaches, crossover approaches, mutation approaches, population sizes, and survivors' selection approaches & elitism (+ belief-space parameters in case of CA). | 5 | | | | | | |
| Implementation | 9 | | | | | | |
| GUI (deduct 3 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 5 marks | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate | | | | | | | |
| Total | 35 | | | | | | |

# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

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|---|---|
| 17) Automated OCR of Handwritten English Letters using Feature Engineering and Decision Trees / Random Forests. | ☐ |

**Team Information *(typed, not handwritten, except for the attendance signature)*:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| Item | Mark | Team Members | | | | | |
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| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 4 | | | | | | |
| Understanding the Dataset and how to deal with the images | 2 | | | | | | |
| Understanding the different Classes (Labels) and Splitting the Data to Training and Testing | 2 | | | | | | |
| Testing using Cross Validation instead of Splitting the Data into Training & Testing | 2 | | | | | | |
| Applying varying Feature Engineering Approaches | 6 | | | | | | |
| Understanding and Constructing a Proper Decision Tree and Random Forests Architectures | 8 | | | | | | |
| Discussion & Analysis of Results – including the effects of different tree heuristics, different tree randomisation approaches, difference in generalisation across DTs/RFs | 5 | | | | | | |
| Implementation | 6 | | | | | | |
| GUI (deduct 3 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 5 marks | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate | | | | | | | |
| Total | 35 | | | | | | |

# AI310/CS361 ARTIFICIAL INTELLIGENCE FALL 2025

## COVER SHEET

**Project Idea:**

| | |
|---|---|
| 16) Feature Selection Using Genetic Algorithms to Train Decision Trees. | ☐ |

**Team Information *(typed, not handwritten, except for the attendance signature)*:**

| | ID [Ordered by ID] | Full Name [In Arabic] | Attendance [Handwritten Signature] | Final Grade |
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| Item | Mark | Team Members | | | | | |
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| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Report (including Problem Definition, Literature Review, References, Relevant Diagrams) | 5 | | | | | | |
| Design of the Encoding and the Fitness Function | 8 | | | | | | |
| Application of the Algorithm – both GA and DT – (including a plot of the performance across the generations for each setting) | 8 | | | | | | |
| Discussion & Analysis of Results – including the effects of parents' selection approaches, crossover approaches, mutation approaches, population sizes, and survivors' selection approaches & elitism. | 5 | | | | | | |
| Implementation | 9 | | | | | | |
| GUI (deduct 3 marks if no proper design for inputs or outputs) | | | | | | | |
| If another algorithm is applied, deduct 5 marks | | | | | | | |
| Deduct 50% to 100% of a Student's grade if (s)he didn't participate | | | | | | | |
| Total | 35 | | | | | | |