

# ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING DEVELOPMENT, ASSOCIATE OF APPLIED SCIENCE

College(s): DA\*, TR\*, WR

Program Code: 0490

The Associate Applied Science degree in Artificial Intelligence and Machine Learning Development is a comprehensive program designed to equip students with the skills and knowledge necessary to thrive in the dynamic field of Artificial Intelligence and Machine Learning. Students will gain hands-on experience with the latest technologies and best practices in the industry, preparing them for a variety of roles in the rapidly evolving Artificial Intelligence (AI) and Machine Learning (ML) landscape. This degree offers a combination of theoretical understanding and practical experience, covering key areas such as data processing, supervised and unsupervised learning, neural networks, deep learning, model deployment, Natural Language Processing (NLP), and Computer vision/Image Processing, and Ethics in Technology. This program also serves as a foundation to further other academic pursuits or for career advancement in the field.

## Program Requirements

| Code                                               | Title                                            | Hours |
|----------------------------------------------------|--------------------------------------------------|-------|
| <b>General Education Coursework</b>                |                                                  |       |
| ENGLISH 101                                        | Composition                                      | 3     |
| MATH 125                                           | Introductory Statistics                          | 4     |
| Fine Arts & Humanities course <sup>1</sup>         |                                                  | 3     |
| Physical Sciences or Life Sciences course          |                                                  | 3     |
| Social and Behavioral Sciences course <sup>1</sup> |                                                  | 3     |
| <b>Required Program Core</b>                       |                                                  |       |
| BUSINES 213                                        | Data Visualization and Presentation for Business | 3     |
| CIS 111                                            | Computer Operations                              | 3     |
| CIS 116                                            | Operating System I                               | 3     |
| CIS 124                                            | Introduction to Cloud Computing                  | 3     |
| CIS 125                                            | Introduction to Artificial Intelligence          | 3     |
| CIS 146                                            | Python Programming I                             | 3     |
| CIS 205                                            | Machine Learning Essentials                      | 3     |
| CIS 210                                            | Natural language Processing                      | 3     |
| CIS 215                                            | Deep Learning Essentials                         | 3     |
| CIS 220                                            | Computer Vision and Image Processing             | 3     |
| CIS 225                                            | Ethics in Information Technology                 | 3     |
| CIS 255                                            | Operating Systems II                             | 3     |
| COMPSFI 101                                        | Networking Essentials                            | 3     |
| NET TEC 101                                        | Client-Server Database I                         | 3     |
| <b>Required Work-Based Learning Courses</b>        |                                                  |       |
| CIS 260                                            | Computer Information Systems Field Project       | 3     |

|                    |                                         |
|--------------------|-----------------------------------------|
| or CIS 265         | Computer Information Systems Internship |
| <b>Total Hours</b> | <b>61</b>                               |

<sup>1</sup> One course must fulfill the Human Diversity (HD) (<https://catalog.ccc.edu/hd/>) requirement.

## Pathway

This is an **example course sequence** for students interested in Artificial Intelligence and Machine Learning Development. It does not represent a contract, nor does it guarantee course availability. If this pathway is followed as outlined, you will earn an Advanced Certificate (AC) and Associate in Applied Science degree (AAS) in Artificial Intelligence and Machine Learning Development.

| Semester 1                                             |                                                  | Hours     |
|--------------------------------------------------------|--------------------------------------------------|-----------|
| CIS 111                                                | Computer Operations                              | 3         |
| CIS 125                                                | Introduction to Artificial Intelligence          | 3         |
| COMPSFI 101                                            | Networking Essentials                            | 3         |
| ENGLISH 101                                            | Composition <sup>1</sup>                         | 3         |
| MATH 125                                               | Introductory Statistics <sup>1</sup>             | 4         |
| <b>Hours</b>                                           |                                                  | <b>16</b> |
| Semester 2                                             |                                                  | Hours     |
| CIS 116                                                | Operating System I                               | 3         |
| CIS 124                                                | Introduction to Cloud Computing                  | 3         |
| CIS 146                                                | Python Programming I                             | 3         |
| NET TEC 101                                            | Client-Server Database I                         | 3         |
| Fine Arts & Humanities course <sup>1,2</sup>           |                                                  | 3         |
| <b>Hours</b>                                           |                                                  | <b>15</b> |
| Semester 3                                             |                                                  | Hours     |
| BUSINES 213                                            | Data Visualization and Presentation for Business | 3         |
| CIS 205                                                | Machine Learning Essentials                      | 3         |
| CIS 225                                                | Ethics in Information Technology                 | 3         |
| CIS 255                                                | Operating Systems II                             | 3         |
| Physical Sciences or Life Sciences course <sup>1</sup> |                                                  | 3         |
| <b>Hours</b>                                           |                                                  | <b>15</b> |
| Semester 4                                             |                                                  | Hours     |
| CIS 210                                                | Natural language Processing                      | 3         |
| CIS 215                                                | Deep Learning Essentials                         | 3         |
| CIS 220                                                | Computer Vision and Image Processing             | 3         |
| CIS 260                                                | Computer Information Systems Field Project       | 3         |
| or CIS 265 or Computer Information Systems Internship  |                                                  |           |
| Social and Behavioral Sciences course <sup>1,2</sup>   |                                                  | 3         |
| <b>Hours</b>                                           |                                                  | <b>15</b> |
| <b>Total Hours</b>                                     |                                                  | <b>61</b> |

<sup>1</sup> General Education Requirement

<sup>2</sup> One course must fulfill the Human Diversity (HD) (<https://catalog.ccc.edu/hd/>) requirement.

## Careers

This program can prepare students for the jobs listed below. Click on each one to learn more, including average earnings, annual job openings, and how much education people in that field have. For additional guidance and resources on career options, current City Colleges students and alumni can contact the Career Services Office (<https://www.ccc.edu/departments/Pages/Career-Services.aspx>).

## Business Intelligence Analysts

### Job Description

Produce financial and market intelligence by querying data repositories and generating periodic reports. Devise methods for identifying data patterns and trends in available information sources.

### Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

#### Annual Wages

|                                          |           |
|------------------------------------------|-----------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$72,642  |
| Median 50 <sup>th</sup> Percentile       | \$112,019 |
| Senior-Level 90 <sup>th</sup> Percentile | \$178,709 |

#### Hourly Wages

|                                          |      |
|------------------------------------------|------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$35 |
| Median 50 <sup>th</sup> Percentile       | \$54 |
| Senior-Level 90 <sup>th</sup> Percentile | \$86 |

### Annual Job Openings

411 annual openings in Cook County

### National Education Attainment

Here, you can see the level of education that people in this career complete.

| Degree Program                    | % of Jobs |
|-----------------------------------|-----------|
| A high school diploma or less     | 0.00%     |
| A certificate                     | 0.00%     |
| Some college                      | 0.00%     |
| An Associate degree               | 4.55%     |
| A Bachelor's degree               | 72.73%    |
| A Master's or Professional degree | 22.73%    |
| A Doctoral degree or more         | 0.00%     |

95.46% continue their education beyond an associate degree

## Computer Systems Analysts

### Job Description

Analyze science, engineering, business, and other data processing problems to develop and implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software.

### Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

#### Annual Wages

|                                          |           |
|------------------------------------------|-----------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$64,002  |
| Median 50 <sup>th</sup> Percentile       | \$108,192 |
| Senior-Level 90 <sup>th</sup> Percentile | \$160,579 |

#### Hourly Wages

|                                          |      |
|------------------------------------------|------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$31 |
| Median 50 <sup>th</sup> Percentile       | \$52 |
| Senior-Level 90 <sup>th</sup> Percentile | \$77 |

### Annual Job Openings

510 annual openings in Cook County

### National Education Attainment

Here, you can see the level of education that people in this career complete.

| Degree Program                    | % of Jobs |
|-----------------------------------|-----------|
| A high school diploma or less     | 0.77%     |
| A certificate                     | 0.54%     |
| Some college                      | 4.62%     |
| An Associate degree               | 50.71%    |
| A Bachelor's degree               | 41.93%    |
| A Master's or Professional degree | 1.42%     |
| A Doctoral degree or more         | 0.00%     |

43.35% continue their education beyond an associate degree

## Computer Programmers

### Job Description

Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

## Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

### Annual Wages

|                                          |           |
|------------------------------------------|-----------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$50,145  |
| Median 50 <sup>th</sup> Percentile       | \$84,310  |
| Senior-Level 90 <sup>th</sup> Percentile | \$176,243 |

### Hourly Wages

|                                          |      |
|------------------------------------------|------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$24 |
| Median 50 <sup>th</sup> Percentile       | \$41 |
| Senior-Level 90 <sup>th</sup> Percentile | \$85 |

## Annual Job Openings

40 annual openings in Cook County

## National Education Attainment

Here, you can see the level of education that people in this career complete.

| Degree Program                    | % of Jobs |
|-----------------------------------|-----------|
| A high school diploma or less     | 0.00%     |
| A certificate                     | 0.00%     |
| Some college                      | 2.52%     |
| An Associate degree               | 8.99%     |
| A Bachelor's degree               | 88.04%    |
| A Master's or Professional degree | 0.45%     |
| A Doctoral degree or more         | 0.00%     |

88.49% continue their education beyond an associate degree

## Database Architects

### Job Description

Design strategies for enterprise databases, data warehouse systems, and multidimensional networks. Set standards for database operations, programming, query processes, and security. Model, design, and construct large relational databases or data warehouses. Create and optimize data models for warehouse infrastructure and workflow. Integrate new systems with existing warehouse structure and refine system performance and functionality.

## Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

### Annual Wages

|                                          |           |
|------------------------------------------|-----------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$104,350 |
| Median 50 <sup>th</sup> Percentile       | \$154,350 |
| Senior-Level 90 <sup>th</sup> Percentile | \$211,292 |

### Hourly Wages

|                                          |       |
|------------------------------------------|-------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$50  |
| Median 50 <sup>th</sup> Percentile       | \$74  |
| Senior-Level 90 <sup>th</sup> Percentile | \$102 |

## Annual Job Openings

48 annual openings in Cook County

## National Education Attainment

Here, you can see the level of education that people in this career complete.

| Degree Program                    | % of Jobs |
|-----------------------------------|-----------|
| A high school diploma or less     | 0.00%     |
| A certificate                     | 4.76%     |
| Some college                      | 0.00%     |
| An Associate degree               | 0.00%     |
| A Bachelor's degree               | 80.95%    |
| A Master's or Professional degree | 14.29%    |
| A Doctoral degree or more         | 0.00%     |

95.24% continue their education beyond an associate degree

## Software Developers

### Job Description

Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.

## Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

### Annual Wages

|                                          |           |
|------------------------------------------|-----------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$87,563  |
| Median 50 <sup>th</sup> Percentile       | \$142,987 |
| Senior-Level 90 <sup>th</sup> Percentile | \$217,902 |

### Hourly Wages

|                                          |       |
|------------------------------------------|-------|
| Entry-Level 10 <sup>th</sup> Percentile  | \$42  |
| Median 50 <sup>th</sup> Percentile       | \$69  |
| Senior-Level 90 <sup>th</sup> Percentile | \$105 |

### Annual Job Openings

1469 annual openings in Cook County

### National Education Attainment

Here, you can see the level of education that people in this career complete.

| Degree Program                    | % of Jobs |
|-----------------------------------|-----------|
| A high school diploma or less     | 3.13%     |
| A certificate                     | 1.67%     |
| Some college                      | 0.00%     |
| An Associate degree               | 5.07%     |
| A Bachelor's degree               | 85.61%    |
| A Master's or Professional degree | 4.52%     |
| A Doctoral degree or more         | 0.00%     |

90.13% continue their education beyond an associate degree