**New York City College of Technology / CUNY**

**Computer Engineering Technology Department**

Introduction to Artificial Intelligence: A New Elective Course for the BTech Program in Computer Engineering Technology

**January 10, 2017**

# TABLE OF CONTENTS

[TABLE OF CONTENTS 1](#_Toc478412476)

[CURRICULUM MODIFICATION PROPOSAL FORM 2](#_Toc478412477)

[ALL PROPOSAL CHECK LIST 4](#_Toc478412478)

[NEW COURSE PROPOSAL FORM 5](#_Toc478412479)

[NEW COURSE PROPOSAL CHECK LIST 7](#_Toc478412480)

[LIBRARY RESOURCES & INFORMATION LITERACY FORM 9](#_Toc478412481)

[COURSE OUTLINE 11](#_Toc478412482)

[COURSE NEED ASSESSMENT 17](#_Toc478412483)

[COURSE DESIGN 17](#_Toc478412484)

[Lectures 17](#_Toc478412485)

[Labs and tutorials 17](#_Toc478412486)

[Homework assignments 18](#_Toc478412487)

[Final project 18](#_Toc478412488)

[COURSE ASSESSMENT 18](#_Toc478412489)

[CHANCELLOR’S REPORT 20](#_Toc478412490)

[Section AIV: New Courses 20](#_Toc478412491)

[CONSULTATION WITH AFFECTED DEPARTMENTS 21](#_Toc478412493)

[DEPARTMENT APPROVAL 23](#_Toc478412494)

[DISCUSSION ABOUT THE COURSE WITH DEAN HOM. 25](#_Toc478412495)

New York City College of Technology, CUNY

# CURRICULUM MODIFICATION PROPOSAL FORM

This form is used for all curriculum modification proposals. See the [Proposal Classification Chart](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/2013-10-09-Proposal_Classification_Chart.pdf) for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.

|  |  |
| --- | --- |
| **Title of Proposal** | **Introduction to Artificial Intelligence: A New Elective Course for the BTech Program in Computer Engineering Technology** |
| **Date** | **October 13, 2016** |
| **Major or Minor** | **Major Proposal** |
| **Proposer’s Name** | **Benito Mendoza and Ohbong Kwon** |
| **Department** | **Computer Engineering Technology** |
| **Date of Departmental Meeting in which proposal was approved** | **October 13, 2016** |
| **Department Chair Name** | **Sunghoon Jang** |
| **Department Chair Signature and Date** |  |
| **Academic Dean Name** | **Kevin Hom** |
| **Academic Dean Signature and Date** |  |
| **Brief Description of Proposal**(Describe the modifications contained within this proposal in a succinct summary. More detailed content will be provided in the proposal body. | **This proposal focus on a new technical elective course that introduces Artificial Intelligence in the computer engineering technology program.** |
| **Brief Rationale for Proposal**(Provide a concise summary of why this proposed change is important to the department. More detailed content will be provided in the proposal body).  | **Artificial Intelligence (AI) is out of the research labs and already plays an active role in our everyday lives. It is present in many applications including virtual personal assistance (Siri, Google Now, etc.), video games, spam and fraud detection, online customer support, news generation, music and movie recommendation services, smart home devices, language translation and more. More cutting edge AI applications, like the Google Self Driving Car, or IBM’s Watson are opening new possibilities and interest by industry.** **We believe knowledge about the principles of AI and its capabilities and limitations is essential for engineering graduates. Following the CET Department’s mission of preparing graduates for immediate employment through theoretical and practical foundations in current and emerging technologies, we propose a new elective course that introduce the principles of AI and its current applications and tools.** |
| **Proposal History**(Please provide history of this proposal: is this a resubmission? An updated version? This may most easily be expressed as a list). | **New proposal/Initial submission** |

Please include all appropriate documentation as indicated in the Curriculum Modification Checklist.

For each new course, please also complete the New Course Proposal and submit in this document.

Please submit this document as a single .doc or .rtf format. If some documents are unable to be converted to .doc, then please provide all documents archived into a single .zip file.

# ALL PROPOSAL CHECK LIST

|  |  |
| --- | --- |
| Completed CURRICULUM MODIFICATION FORM including: |  |
| * Brief description of proposal
 | Y |
| * Rationale for proposal
 | Y |
| * Date of department meeting approving the modification
 | Y |
| * Chair’s Signature
 | Y |
| * Dean’s Signature
 | Y |
| Evidence of consultation with affected departmentsList of the programs that use this course as required or elective, and courses that use this as a prerequisite. | Y |
| Documentation of Advisory Commission views (if applicable). | N/A |
| Completed [Chancellor’s Report Form](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/2013-10-09-Chancellor_Report_Quick_Reference_Guide1.doc). | Y |

**EXISTING PROGRAM MODIFICATION PROPOSALS**

|  |  |
| --- | --- |
| Documentation indicating core curriculum requirements have been met for new programs/options or program changes.  | N/A |
| Detailed rationale for each modification (this includes minor modifications) |  Y |

New York City College of Technology, CUNY

# NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the [Curriculum Modification Proposal Form](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/2013-10-10-Curriculum_Modification_Proposal_Form.docx) and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

|  |  |
| --- | --- |
| **Course Title** | Introduction to Artificial Intelligence |
| **Proposal Date** | October 13, 2016 |
| **Proposer’s Name**  | Benito Mendoza and Ohbong Kwon |
| **Course Number** | CET4973 |
| **Course Credits, Hours** | 2 Class Hours, 2 Lab Hours, 3 Credits |
| **Course Pre / Co-Requisites** | Pre/Co CET4711 or Department Approval |
| **Catalog Course Description** | Introduction to basic methods of Artificial Intelligence (AI) such as searching, knowledge representation, problem solving, and learning. Through discussions, small projects, and examples, students learn what AI is, some of the major developments in the field, promising directions, and the techniques for making computers exhibit intelligent behavior. Students make use of available tools and explore some areas of application such as recommender systems, natural language processing, robotics, and machine learning. |
| **Brief Rationale**Provide a concise summary of why this course is important to the department, school or college. | Artificial Intelligence (AI) is out of the research labs and already plays an active role in our everyday lives. It is present in many applications including virtual personal assistance (Siri, Google Now, etc.), video games, spam and fraud detection, online customer support, news generation, music and movie recommendation services, smart home devices, language translation and more. More cutting edge AI applications, like the Google Self Driving Car, or IBM’s Watson are opening new possibilities and interest by industry. We believe knowledge about the principles of AI and recognizing AI’s capabilities and limitations is essential for engineering graduates. Following the CET Department’s mission of preparing graduates for immediate employment through theoretical and practical foundations in current and emerging technologies, we propose a new elective course that introduce the principles of AI and current applications and tools. |
| **TIPPS – Course Equivalencies**Provide information about equivalent courses within CUNY, if any. | The search for the keywords “artificial intelligence” returned the following courses. However, only the one at CSI is currently offered.* College of Staten Island | CSC 480 - Artificial Intelligence
* Lehman College | CMP 414 - Artificial Intelligence
* Medgar Evers College | CS 280 - Artificial Intelligence
* Queens College | CSCI 363 - Artificial Intelligence
* York College | CS 377 - Artificial Intelligence
 |
| **Intent to Submit as Common Core**If this course is intended to fulfill one of the requirements in the common core, then indicate which area. | No |
| **For Interdisciplinary Courses:*** Date submitted to ID Committee for review
* Date ID recommendation received

- Will all sections be offered as ID? Y/N | N/A |
| N/A |
| N |
| **Intent to Submit as a Writing Intensive Course** | N |

Please include all appropriate documentation as indicated in the NEW COURSE PROPOSAL Combine all information into a single document that is included in the Curriculum Modification Form.

# NEW COURSE PROPOSAL CHECK LIST

Use this checklist to ensure that all required documentation has been included. You may wish to use this checklist as a table of contents within the new course proposal.

|  |  |
| --- | --- |
| **Completed NEW COURSE PROPOSAL FORM** |  |
| * Title, Number, Credits, Hours, Catalog course description
 | Y |
| * Brief Rationale
 | Y |
| * TIPPS – Course Equivalencies
 | Y |
| Completed [Library Resources and Information Literacy Form](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/curriculum_modification_library_form.doc) | Y |
| **Course Outline** Include within the outline the following. | **Y** |
| Hours and Credits for Lecture and LabsIf hours exceed mandated Carnegie Hours, then rationale for this | Y |
| Prerequisites/Co- requisites | Y |
| Detailed Course Description | Y |
| Course Specific Learning Outcome and Assessment Tables* Discipline Specific
* General Education Specific Learning Outcome and Assessment Tables
 | Y |
| Example Weekly Course outline | Y |
| Grade Policy and Procedure | Y |
| Recommended Instructional Materials (Textbooks, lab supplies, etc.) | Y |
| Library resources and bibliography |  |
| **Course Need Assessment.** Describe the need for this course. Include in your statement the following information. | Y |
| Target Students who will take this course. Which programs or departments, and how many anticipated?Documentation of student views (if applicable, e.g. non-required elective). | Y |
| Projected headcounts (fall/spring and day/evening) for each new or modified course. | Y |
| If additional physical resources are required (new space, modifications, equipment), description of these requirements. If applicable, Memo or email from the VP for Finance and Administration with written comments regarding additional and/or new facilities, renovations or construction. | Y |
| Where does this course overlap with other courses, both within and outside of the department? | Y |
| Does the Department currently have full time faculty qualified to teach this course? If not, then what plans are there to cover this? | Y |
| If needs assessment states that this course is required by an accrediting body, then provide documentation indicating that need. | Y |
| **Course Design**Describe how this course is designed.  | Y |
| Course Context (e.g. required, elective, capstone) | Y |
| Course Structure: how the course will be offered (e.g. lecture, seminar, tutorial, fieldtrip)? | Y |
| Anticipated pedagogical strategies and instructional design (e.g. Group Work, Case Study, Team Project, Lecture) | Y |
| How does this course support Programmatic Learning Outcomes? | Y |
| Is this course designed to be partially or fully online? If so, describe how this benefits students and/or program. | Y |
| **Additional Forms for Specific Course Categories** | N/A |
|  [Interdisciplinary Form](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/Application-for-Interdisciplinary-Course-Designation.docx) (if applicable) |  |
|  Interdisciplinary Committee Recommendation (if applicable and if received)\* \*Recommendation must be received before consideration by full Curriculum Committee |  |
| [Common Core (Liberal Arts) Intent to Submit](http://openlab.citytech.cuny.edu/collegecouncil/files/2014/08/CommonCoreCourseSubmissionForm_4.2.12.doc) (if applicable) |  |
| Writing Intensive Form if course is intended to be a WIC (under development)  |  |
| If course originated as an experimental course, then results of evaluation plan as developed with director of assessment. |  |
| **(Additional materials for** [**Curricular Experiments**](http://www.300jaystreet.com/college-council/curriculum_proposals/curricular-experiments)**)** | N/A |
| Plan and process for evaluation developed in consultation with the director of assessment. (Contact Director of Assessment for more information). |  |
| Established Timeline for Curricular Experiment |  |

# LIBRARY RESOURCES & INFORMATION LITERACY FORM

MAJOR CURRICULUM MODIFICATION

Please complete for **all** major curriculum modifications. This information will assist the library in planning for new acquisitions; it will not affect curriculum proposals either positively or negatively.

Consult with library faculty subject selectors (<http://cityte.ch/dir>) **3 weeks in advance** when planning course proposals to ensure enough time to allocate budgets if materials need to be purchased.

**Course proposer:** please complete boxes 1-4. **Library faculty subject selector:** please complete box 5.

|  |  |  |
| --- | --- | --- |
| **1** | **Title of proposal**Introduction to Artificial Intelligence: A New Elective Course for the BTech Program in Computer Engineering Technology | **Department/Program**Computer Engineering Technology  |
|  | **Proposed by** (include email & phone)Benito MendozaBMendoza@citytech.cuny.edu / 718-260-5439Ohbong KwonOKwon@citytech.cuny.edu / 718-260-5437  | **Expected date course(s) will be offered** Spring 2018**# of students:** 15 to 20 |

|  |  |
| --- | --- |
| **2** | **Are City Tech library resources sufficient for course assignments? Please elaborate.**Yes, the library has enough resources for course assignments. A search on the CITY TECH’s Library Portal for the following topics: **Artificial Intelligence**, **Natural Language Processing**, **Machine Learning, Knowledge Representation**, and **Robotics,** returned thousands of Peer-Reviewed Journals and Full Text Online, and tenths Currently on Shelf items.  |

|  |  |
| --- | --- |
| **3** | **Are additional resources needed for course assignments? Please provide details about format of resources (e.g., ebooks , journals, DVDs, etc.), author, title, publisher, edition, date, and price.**It would help to have some copies of the text books:**Textbook 1**: Artificial Intelligence: A Modern Approach (3rd Edition), Stuart Russel and Peter Norving, Pearson (2009), ISBN-13: 978-0136042594, ISBN-10: 0136042597 **Lab Textbook**: Programming Collective Intelligence: Building Smart Web 2.0 Applications, Toby Segaran, O'Reilly Media; 1st edition (August 26, 2007), ISBN-10: 0596529325, ISBN-13: 978-0596529321  |

|  |  |
| --- | --- |
| **4** | **Library faculty focus on strengthening students' information literacy skills in finding, evaluating, and ethically using information. We can collaborate on developing assignments and offer customized information literacy instruction and research guides for your course.****Do you plan to consult with the library faculty subject specialist for your area? Please elaborate.**Once the course is offered, the department faculty teaching the course may consult with the library’s subject specialist to determine future needs of textbook change or update, and acquisition of additional resources. However, this elective course is for senior students, they should be able to conduct research independently with minimal assistance. The instructor is responsible for any discipline specific research assistance.  |

|  |  |
| --- | --- |
| **5** | **Library Faculty Subject Selector: Junior Tidal** **Comments and Recommendations**After surveying the library’s collection, it is my recommendation that the library acquire more monographs to support this course, in addition to the textbook. There are few titles on the subject of artificial intelligence within the library many of which are outdated. Since this is a constantly changing subject area, I also recommend that there should be a focus on eBooks to ensure that students have the latest information. It may also be necessary to acquire multimedia, such as videos and documentaries, to further enhance the library’s collection. **Date 1.11.2017** |

# ­COURSE OUTLINE

New York City College of Technology

Computer Engineering Technology Department

BTech Program in Computer Engineering Technology

**CET4973: Introduction to Artificial Intelligence**

|  |  |  |  |
| --- | --- | --- | --- |
| **Prepared by** | Benito Mendoza and Ohbong Kwon | **Revision date** | Jan 10, 2017 |
| **Course No. & Title** | CET4973: Introduction to Artificial Intelligence  |
| **Course Description** | Introduction to basic methods of Artificial Intelligence (AI) such as searching, knowledge representation, problem solving, and learning. Through discussions, small projects, and examples, students learn what AI is, some of the major developments in the field, promising directions, and the techniques for making computers exhibit intelligent behavior. Students make use of available tools and explore some areas of application such as recommender systems, natural language processing, robotics, and machine learning. |
| **Hours / Credits** | 2 Class hour, 2 Lab Hours, 3 Credits |
| **Pre-requisites** |  |
| **Pre/Co-requisites** | CET4711 or Department approval |
| **Gen-Ed Objectives** | **Integrate learning*** Resolve difficult issues creatively by employing multiple systems and tools.

**Communication*** Students will develop a written design report and oral presentation for faculty and peers.

**Systems*** Understand and navigate systems
 |
| **Course Learning Outcomes** | * Understand what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
* Understand the limitations of current Artificial Intelligence techniques.
* Familiarity with classical Artificial Intelligence techniques, such as search algorithms, knowledge representation, agents, and learning.
* Recognize how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.
* Ability to apply Artificial Intelligence methods and engineering techniques for solving narrowly defined problems.
 |

|  |  |  |
| --- | --- | --- |
| **Lecture Textbook** | Artificial Intelligence: A Modern Approach (3rd Edition) | Artificial Intelligence: A Modern Approach (3rd Edition) |
| **Author** | Stuart Russel and Peter Norving |
| **Publisher** | Pearson (2009) |
| **ISBN** | ISBN-13: 978-0136042594ISBN-10: 0136042597 |

|  |  |  |
| --- | --- | --- |
| **Lab Textbook** | Programming Collective Intelligence: Building Smart Web 2.0 Applications | Programming Collective Intelligence: Building Smart Web 2.0 Applications |
| **Author** | Toby Segaran |
| **Publisher** | O'Reilly Media (December 17, 2008) |
| **ISBN** | ISBN-10: 0596529325ISBN-13: 978-0596529321 |

|  |  |  |
| --- | --- | --- |
| **Text / Ref. book 1** | Artificial Intelligence in the 21st Century: A Living Introduction, Second Edition | Artificial Intelligence in the 21st Century: A Living Introduction, Second Edition |
| **Author** | Stephen Lucci and Danny Kopec |
| **Publisher** | Mercury Learning (2016) |
| **ISBN** | ISBN-13: 9781942270003 |

|  |  |  |
| --- | --- | --- |
| **Text / Ref. book 2** | Essentials of Artificial Intelligence | Essentials of Artificial Intelligence |
| **Author** | Matt Ginsberg |
| **Publisher** | Morgan Kaufmann Publishers Inc. |
| **ISBN** | ISBN-13: 9780323139687 |

|  |  |  |
| --- | --- | --- |
| **Text / Ref. book 3** | What Every Engineer Should Know About Artificial Intelligence | https://images-na.ssl-images-amazon.com/images/I/51iEjwQwEvL.jpg |
| **Author** | William A. Taylor |
| **Publisher** | The MIT Press (April 7, 1988) |
| **ISBN** | ISBN-10: 0262200694ISBN-13: 978-02622006 |

| **Week** | **Lecture Topic (CET4973)** | **Lab/Project** | **Book(s) Chapter** |
| --- | --- | --- | --- |
| **PART I: Introduction** |
| 1 | * Course outline, classroom conduct, academic integrity, attendance, and grading policy.
* **Introduction to AI**: foundations; applications; past, present, and future.
 | **Discussion of existing applications*** Case study: IBM Watson in the Jeopardy challenge
 | Ch. 1 R&N |
| 2 | * **Computer Programming for AI**
 | **AI programming with Python**: * Development of several small Python programs
 | [Tutorial by Stuart Russell](http://www.cs.berkeley.edu/~russell/classes/cs188/f14/tutorial.html#PythonBasics) |
| **PART II: Search and Optimization** |
| 3 | * **EXAM I (PART I)**
* **Solving problems by searching**: uninformed search; heuristic search.
* **Beyond Classical Search**: optimization problems and genetic algorithms
 | **Representing games and problems as search problems.** * Students use a Python implementation of the search algorithms provided by Russell & Norvig.
* Their job is to represent a game or problem as a search problem in a Python class that follows certain requirements. Then they use it as input to the provided code.

**Performance comparison of the search algorithms.*** Students compare the algorithms performance for the following games:
	+ 8-puzzle,
	+ N-queens, and
	+ Tic-tac-toe
 | Ch. 3 and 4.1 R&N |
| 4 | * **Adversarial games**: minimax and alpha-beta pruning
* **Constraint satisfaction problems**: backtracking search
 | R&N 5.1 – 5.3, 6.3 |
| **PART III: Statistical AI**  |
| 5 | * **EXAM II (PART II)**

**Recommender systems**:* Collaborative filtering
* Collecting preferences
* Finding similar users
* Recommending items
 | **A Netflix-Like recommender system for movies*** Students use code provided by Segaran and follow the instructions to complete it, get the data, and run it.
 | Ch. 2 Segaran |
| 6 – 7 | **Supervised Machine Learning**: * Classification
* Decision trees
* Naïve Bayes
* K-nearest neighbors
 | **Application of ML algorithms to real life problems**.* Estimating prices for eBay products,
* Matching on Facebook,
* Modeling home prices on Zillow,
* Filtering email Spam,
* Filtering blog feeds, and
* Discovering topics and preferences from blogs.

Students use code provided by Segaran and follow the instructions to complete it, get the data, and run it.Students choose only 1 application and 1 algorithm to work with.Students present their work to the class. | Ch. 18 R&N; Ch. 1 Segaran |
| 8 | **Unsupervised Machine Learning:*** Supervised versus unsupervised learning
* Hierarchical clustering
* K-means clustering

 | Ch. 3 Segaran |
| **PART IV: Advanced topics**  |
| 9 | * **EXAM III (PART III)**

**Natural language processing*** Text understanding
* Text generation
* Speech understanding
* Speech generation
 | **Creating a ChatBot**:* Construct a simple chatbot that evaluates and responds to user input.
 | Ch. 22 R&N |
| 10 – 11  | **Robotics:*** Hierarchical/deliberative paradigm (Planning)
* Reactive paradigm
* Hybrid paradigm
* Subsumption architecture
 | **Robot Navigation**:* A simulated robot that plans and moves collecting goods and avoiding obstacles
 | Ch. 25 R&N |
| 12 | **Reinforcement learning*** Q-Learning

  | **The robot that looks for rewards*** Reinforcement learning applied to robotics
 | Ch. 21 R&N |
| **PART V: Final project**  |
| 13 | * **EXAM IV (PART IV)**
* **Project hours**
 | Students select a project where they use AI development tools such as Google’s Tensor Flows, Amazon Alexa, Microsoft Cognitive Services etc. |  |
| 14 | * **Project hours**
 | Students work on their final project, present advances, and discuss with instructor any obstacle that have might arise. |  |
| 15 | * **Final project presentation and demonstration**
 |  |  |

**COURSE POLICIES:**

**Grading:**

* Exams (4) 30 %
* Final Project 30 %
* Lab Exercises/projects and Lab Reports: 25 %
* Homework Assignments: 15 %
* Total: 100 %

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Score % | < 60 | 60-69.9 | 70-76.9 | 77-79.9 | 80-82.9 | 83-86.9 | 87-89.9 | 90-92.9 | 93-100 |
| Grade | F | D | C | C+ | B- | B | B+ | A- | A |

**Blackboard:**

* Blackboard will be used extensively to provide course material, collect assignments and reports and provide detailed grading information. Students must make sure their Blackboard login is working in the beginning of the course.

**Reading and Reference Material:**

* Reading and reference material will be provided in Blackboard and OpenLab– Contents section as needed.

**Software for Lab / Project:**

* Free or open-source software applications will be used in the labs and course project. The main programming language is Python (Open source). The links to download the software will be posted in Blackboard.

**Lab Reports:**

* Lab reports must be in Word .doc file format.
* All lab reports must be submitted through Blackboard – Assignments section.
* Additional requirements on lab report’s content and format will be posted on Blackboard. Please read them carefully.

**Library Usage:**

* Students are encouraged to use the library for supplementary resources in support of the lectures and labs.

**Classroom Conduct Policy:**

* Cell phone ringing and any other distracting and disruptive behavior such as talking loudly without permission are absolutely prohibited and may cause the student to be expelled from class.
* Any activity that threatens the college academic integrity will result in a disciplinary action.
* Please refer to the Student Handbook and the Catalog of New York City College of Technology for a full listing of Student Code of Conduct, Classroom Behavior Guidelines and Academic Integrity Rules.

**Academic Integrity Policy:**

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion.

# COURSE NEED ASSESSMENT

This course is offered to senior or junior students in the Computer Engineering Technology BTECH program. We anticipate around 15 to 20 students per semester. The course will be offered as a technical elective (not-required).

There is no similar course available within CITY TECH. This course might be of interest for students in the Computer System Technology department and the Entertainment Technology Department.

No additional physical resources are required since students will take the course in one of the computer labs in the CET department. Students just need a computer with Internet connection. The software and development tools used for projects are Open Source or free.

Existing faculty in the CET department is qualified and available to teach this course. Adequate equipment and lab resources are also available for the hands-on component of the course.

# COURSE DESIGN

As mentioned before this course is planned to be a technical elective course. The course will be primarily delivered through three activities:

* Lectures
* Labs/Tutorials
* Homework Assignments

Programmatic course learning outcomes will be assessed trough exams, lab/tutorials assignments, homework, and the final project.

## Lectures

Lectures will introduce and motivate the basic concepts of each topic using as example a real life application. Significant discussions and two-way communication are also expected during lectures to enrich the learning experience. Through problem solving and discussions in a small class room setting, hands-on labs and tutorials provide opportunities for obtaining feedback.

## Labs and tutorials

The labs and tutorials will be designed following the POEER (Predict, Observe/Experiment, Explain, and Reflect) pattern. The POEER pattern guides students' interpretation of the content material. The POEER pattern guides students for writing and justifying predictions, describe observations of data collected by well-designed experiments, and use evidence to explain changes to their predictions.

The lab assignments will reinforce theoretical concepts by their application to problem solving to real application. This will be done via programming work. The programming language used in this course is Python. Students enrolled in the CET program learn Python since first semester. The in-class laboratory work has to be completed in the classroom time. Lab assignments are graded according to the following criteria:

|  |  |
| --- | --- |
| Criteria |  Grade |
| Successfully completed the lab assignment |  100 |
| Made a legitimate attempt to complete the lab assignment |  75 |
| Attended the lab, but made no effort to complete the assignment |  30 |
| Did not attend the lab |  0 |

## Homework assignments

Homework assignments will consist extensions to the students’ solutions provided in the problems presented in the Observe/Experiment section. In some cases students will be prescribed with a set of requirements to achieve. In some cases, students will define the scope of the extension based on their interest.

## Final project

Students will have about 3 weeks to complete a final project. Students select a project where they use AI development tools such as Google’s Tensor Flows, Amazon Alexa, Microsoft Cognitive Services etc. The final project, you should include a short report. This report should consist of a short (~2 page) description of problem solved and the AI's approach used. The project will be assessed by the project report, the project representation, and the project code. We will provide the corresponding assessment rubrics.

**Technology expectations and outcomes for students.** At the end the course, students will be able to use Python and several industry standard developing tools (from Microsoft, Google, or Amazon) to apply Artificial Intelligence methods and engineering techniques for creating some artifacts or applications that provide a real life needed service or solve some narrowed real life problems.

# COURSE ASSESSMENT

Lab projects will be assessed based on the table described above. Homework will use a similar approach. The final project will be assessed based on a performance appraisal using a scoring rubric (to be designed).

|  |  |
| --- | --- |
| **Gen-Ed Objectives** | **Assessment method(s)** |
| **Integrate learning*** Resolve difficult issues creatively by employing multiple systems and tools.
 | Final project and homework  |
| **Communication*** Students will develop a written design report and oral presentation for faculty and peers.
 | Final project report and final project presentation  |
| **Systems*** Understand and navigate systems
 | Lab assignments and final project.  |

|  |  |
| --- | --- |
| **Course Learning Outcomes** | **Assessment method(s)** |
| * Understand what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
 | Exam I (Part I) |
| * Understand the limitations of current Artificial Intelligence techniques.
 | Exam I and Exam II |
| * Familiarity with classical Artificial Intelligence techniques, such as search algorithms, knowledge representation, agents, and learning.
 | Exam IILab Assignments Homework Assignment’s |
| * Recognize how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.
 | Exams III and IVLab Assignments Homework Assignment’s |
| * Ability to apply Artificial Intelligence methods and engineering techniques for solving narrowly defined problems.
 | Final project |

# CHANCELLOR’S REPORT

## Section AIV: New Courses

### AIV.1

|  |  |
| --- | --- |
| **CUNYfirst Course ID** | **N/A** |
| **Department(s)** | **Computer Engineering Technology** |
| **Career** | **[ X ] Undergraduate  [ ] Graduate**  |
| **Academic Level** | **[ X ] Regular  [   ] Compensatory  [   ] Developmental  [   ] Remedial**  |
| **Subject Area** | **Computer Engineering Technology** |
| **Course Prefix** | **CET** |
| **Course Number** | **4973** |
| **Course Title** | **Introduction to Artificial Intelligence** |
| **Catalogue Description** | Introduction to basic methods of Artificial Intelligence (AI) such as searching, knowledge representation, problem solving, and learning. Through discussions, small projects, and examples, students learn what AI is, some of the major developments in the field, promising directions, and the techniques for making computers exhibit intelligent behavior. Students make use of available development tools and explore some areas of application such as recommender systems, natural language processing, robotics, and machine learning. |
| **Pre/ Co Requisites** | **CET4711 (or department approval)** |
| **Credits** | **3** |
| **Contact Hours** | **2 Class Hours, 2 Lab Hours** |
| **Liberal Arts** | **[ ] Yes  [ X ] No**  |
| **Course Attribute (e.g. Writing Intensive, Honors, etc.)** |  |
| **Course Applicability** |

|  |  |  |  |
| --- | --- | --- | --- |
| **[ X ] Major** |  |  |  |
| **[ ] Gen Ed Required** | **[ ] Gen Ed - Flexible** | **[ ] Gen Ed - College Option** |
| **[ ] English Composition** | **[ ] World Cultures** | **College Option Detail\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **[ ] Mathematics** | **[ ] US Experience in its Diversity** |  |
| **[ ] Science** | **[ ] Creative Expression** |  |
|  |  | **[ ] Individual and Society** |  |
|  |  | **[ ] Scientific World** |  |

 |
| **Effective Term** | **Spring 2018** |

Rationale: Artificial Intelligence (AI) is out of the research labs and already plays an active role in our everyday lives. It is present in many applications including virtual personal assistances, video games, spam and fraud detection, music and movie recommendation services, smart home devices, and more. More cutting edge AI applications, like the Self Driving Car, or IBM’s Watson are opening new possibilities and interest by industry. Following the CET Department’s mission of preparing graduates for immediate employment through theoretical and practical foundations in current and emerging technologies, we propose a new elective course that introduce the principles of AI and its current applications and development tools. We believe knowledge about the principles of AI and its capabilities and limitations is essential for engineering graduates.

# CONSULTATION WITH AFFECTED DEPARTMENTS

We have contacted other departments that might be interested in this course. The MATH Department has an AAS in Computer Science. Entertainment Technology and Computer System Technology students might also be interested. Students from other programs might be accepted upon CET Department approval.

**Original email sent to the MATH, CST, and ENT Departments**



**Response from the ENT Department**



# DEPARTMENT APPROVAL

**2016-10-13 Departmental Meeting Minutes**

Present: Sunghoon Jang, Robert Armstrong, Seymour Blank, Aparicio Carranza, Ohbong Kwon, Xiaohai Li, Lili Ma, Benito Mendoza, Edward Morton, John Razukas, José M. Reyes Álamo, Yu Wang, Chen Xu, Farrukh Zia, Loretta Davidman

Started at 12:50 PM

1. Approval of the minutes of the previous department meeting
	1. Correction to Profs. names in item 9d.
	2. Minutes approved.
2. Chair's statement and report of the current developments in the development and college
	1. Analysis of the enrollment report. Enrollment dropped a little bit.
	2. Discussion of possible reasons such as space, pre-requisites, and students transferring to other departments.
	3. Tentative schedule for Spring is available.
	4. Discussion of the “Introduction to Artificial Intelligence” (CET 4973) course.
		1. Will be officially submitted for the next cycle as the deadline for this term already passed.
		2. Faculty were asked to review the proposal.
		3. CET 4711 listed as a pre-requisite because of the level of math.
		4. Approved
3. Peer class observation assignment & EAR for Fall 2016 and MCF for Spring 2017
	1. Discussion about the policy of exempting peer class observation for adjuncts that have been teaching for more than 10 semesters. Only schedule an observation under special circumstances according to policy.
	2. Faculty unanimously agreed to this change.
4. New course proposals (CET 4925, CET 4935, and EMT 2410)
	1. Plans for EMT 2410 currently is to offer it as an elective and alternative to CST 2403.
	2. CET 4925 – IoT is officially approved and will be offered.
5. Updated PVN (Personnel Vacancy Notice) for new opening position of CET department
	1. Discussion about the PVN draft and the changes in the qualifications section and the degrees section.
	2. PVN approved by the Department unanimously.
	3. Department will contact members who applied before and asked for more time and are still interested.
6. Recruiting activities schedule with Lutron Services by Professor Zia
	1. Lutron will be doing another round of recruitment. Proposed date: end of October.
	2. Faculty are asked to please tell their students specially the seniors.
7. Articulation Agreement (AA) with William E. Grady High School in Brooklyn by Professor Wang
	1. This school has a 4-year technical program and would like to have an articulation agreement with us.
	2. Check other Departments with AA with high schools.
	3. Discussion about what courses may be credited as well as the level of math and physics they cover.
	4. Plan to invite the school to present data about their students to better understand their preparation.
	5. Plans to visit the school and schedule interviews with the principal, the teachers, and students.
8. Paid Undergraduate Internship and Research opportunities by NASA and ATE NSF by Professor Wang
	1. Prof. Wang has been accepted as a co-PI of the ATE grant and several students will be able to benefit from it with internships.
9. Presentation of Alumni Data collected by Professor Li
	1. Presentation of several statistics about our alumni and how they were contacted.
10. Updated EMT 1111 course curriculum
	1. Discussion about the changes to the course and removal of topic like tuples and dictionaries the re-incorporation of number system and logic gates.
	2. Various suggestions and recommendations for topics and exercises were given. Creation of a lab manual was suggested.
11. Updates of EMT and CET curriculum by Professors Blank and Carranza
	1. Curriculum meeting in 2 weeks. October 27 12:45 PM - 2:00 PM.
12. ~~ABET Assessments of CET programs by Professors Zia and Mendoza.~~
13. ~~Gen Ed Assessments of CET programs by Professor Li.~~
14. ~~Plans by chairs of departmental committees.~~
15. Good and Welfare
	1. Pending items moved to the next meeting.
	2. Need to develop the final exam for EMT 1150.
	3. Congratulations to Prof. Morton on his prize from the National Society of Black Engineers.

Meeting Adjourned at 2:30 PM

Scribe: José M. Reyes Álamo

# DISCUSSION ABOUT THE COURSE WITH DEAN HOM.

On March 27, the proposers and the CCCC subcommittee representatives met with Dean Kevin Home. He agreed on the importance of knowledge about Artificial Intelligence for a graduate of the CET program, and other programs from other departments (CST, MECH, ET). His vision of AI is that is a field that is playing a big part of our daily activities in our society. Moreover, the near future impact of artificial intelligence in our lives is expected to be even bigger and more important.

Dean Hom extended his support to the course proposal. He stated that there is no doubt that course addresses a necessary topic and set of workforce skills, and that the students in CET Department would benefit from this course. He also mentioned that he would have liked to have involvement from other departments in the School of Technology and Design and make this course an interdisciplinary course.