UMBC UGC Program Changes & Other Request: Computer Science Major

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|	Name	Email	Phone	Dept
Dept Chair or UPD	Jeremy Dixon	jdixon@umbc.edu	5-8866	CSEE
Other Contact	Tim Finin	finin@umbc.edu	5-3522	CSEE

Specifics (see instructions):

We are proposing to add a fourth study track to our computer science major named Artificial Intelligence/Machine Learning (AI/ML). We currently have game development, data science, and cybersecurity. This track defines four of the five computer science elective courses that computer science majors are required to take. See the attached document for additional details.

Rationale (see instructions):

Artificial intelligence is proving to be one of the most significant technological advancement across all industries in recent decades with employer demand having doubled over the past three years. According to Tech Republic, "Year-over-year growth in the volume of AI-related job postings measured nearly 32% from January 2017 to January 2018." In addition, AI positions are now appearing across many sectors including finance, healthcare, transportation, agriculture, and energy (among many others).

Machine learning has exploded by helping companies with everything from improving customer retention rates to driving enhanced insights from big data and even mitigating supply chain risks. According to a report by Research and Markets, the global machine learning market is projected to grow from $1.4B in 2017 to $8.8B in 2022.

Finally, this track is very much in line with local employer demands as described by the Greater Washington Partnership which has described an AI/ML concentration. This track will help meet the needs projected by that group and endorsed by many local universities including UMBC.
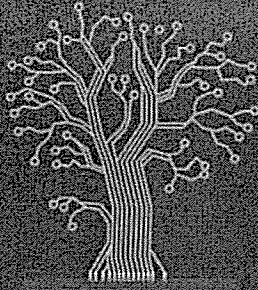
Computer Science Artificial Intelligence and Machine Learning Track

CMSC Artificial Intelligence and Machine Learning Track

CMSC majors can apply to get a notation on their transcript showing that that they have fulfilled the requirements of the *artificial intelligence and machine learning track (AIML)* by filling out a <u>form</u> and completing the required courses with a grade of C or better.

Requirements

You must take both of the following courses.

- CMSC 471, Introduction to artificial intelligence
- CMSC 478, Introduction to machine learning

You must take at least two of the following courses.

- CMPE 422, Digital signal processing
- CMSC 462, Introduction to Data Science
- CMSC 473, Introduction to natural language processing
- CMSC 475, Introduction to neural networks
- CMSC 476, Information retrieval
- CMSC 477, Agent architectures and multiagent systems
- CMSC 479, Introduction to robotics
- Any of the approved CMSC or CMPE 491 special topics courses that fall within an AI topic area. These currently include:
  - CMSC 491, Computer Vision
  - CMSC 491, Knowledge Graphs
  - CMSC 491, Advanced Robotics
- Other courses are allowed with the approval of the track director
- Graduate level versions of any of the approved courses can be substituted with permission of the track director

If you believe you have an elective other than these that is related to AI or ML, you can email the AI/ML Track director to see if it can be considered as a valid track elective.

How to apply for the CMSC AIML track

You can declare your intention to follow the AIML track by filling out the <u>Undergraduate Declaration of Major, Minor, and Certificate</u> form specifying that you are following the AIML track and submitting it to the Registrar's Office in the Academic Services Building.

AIML track director

The current track director is tbd (tbd@csee.umbc.edu)

Other CMSC tracks

- CYBR: <u>Cybersecurity track</u>
- DSCI: <u>Data science track</u>
- GDEV: <u>Game development track</u>

CMSC AIML track FAQ

Q: When can I declare that I am following the track?
A: CMSC majors can declare that they are following the track any time in their program, but we recommend that you wait until you have completed CMSC 471 with a grade of C or better.

Q: What is a typical sequence of courses to take if I want to complete the AIML track?
A: A description of a typical academic pathway for the Computer Science B.S. majors who want to complete the track can be found <u>here</u>.

Q: I took a course at another university that I think might satisfy a track requirement. How can I find out if it does?
A: Please contact the AIML track director.

Q: Can I complete more than one track, e.g., AIML and DSCI?
A: Yes, you apply for more than one track and will receive a completion notation on your transcript for the tracks whose requirements have been satisfied.

Q: Can other majors (e.g., CMPE) get recognition for completing the AIML track?
A: No, tracks are specific to a major, in this case CMSC.

Notes

Track approval process

- Target: approval asap, but probably cannot happen until sometime in Fall 2019
- Reach consensus on proposed track and write up a description suitable for sharing with various committees by mid-March
- Approval my CMSC undergrad committee by April
- Presentation to and approval by CSEE faculty in April
- Presentation to and approval by UMBC Undergraduate Committee this Spring or in Fall
- Presentation to and approval by UMBC Faculty Senate in Fall 2019

Implementation steps

- Work with Cathy Bielawski and registrar to make it part of the system
- Update CSEE web pages as needed
- Advertise to our faculty and students
- Monitor uptake and completion of this track and others
- Create and maintain a mailing list of students enrolled in the AI track to use for occasional news and updates. The list can be updated from Rex data each semester.

October 28, 2019

Dear UGC,

Below is a summary of the 7 changes that the Department of Computer Science and Electrical Engineering (CSEE) is proposing regarding the Computer Science program (CMSC).

Our goal is to have all of these go into effect in January 2020.

Thank you,

Jeremy Dixon
Undergraduate Program Director – Computer Science
CSEE
UMBC

Num	Name of Change	Change Type	Course Number	Description of Change	Related Files
1	New Study Track - AI/ML	Program Change	XXX	New Study Track	Program_Change_AI-ML.docx Program_Change_CMSC AI Track Details.docx
2	Change to CMSC Tracks	Program Change	XXX	Change requirements for CMSC students who complete multiple tracks.	Program_Change_CMSC_Tracks.docx
3	Change to CMSC Natural Science Requirement	Program Change	XXX	Change natural science requirements for CMSC majors. Going from 12 credits (sequence of BIO1/BIO2 or CHEM1/CHEM2 or PHYS1/PHYS2 + 4 additional credits) to 10-12 credits (sequence of BIO1/BIO2 or CHEM1/CHEM2 or PHYS1/PHYS2 + one lab science to include SCI100 or CHEM102L or PHYS122L or GES286) Additionally, students who transfer from a school with a lab science will have met this lab requirement.	Program_Change_CMSC_Natural_Science_Change.docx
4	Malware Analysis	New Course	CMSC 491 to CMSC 449	New Course - converting CMSC 491 to CMSC 449	NewCourse_CMSC449_-_Malware_Analysis.docx NewCourse_CMSC449_-_Malware_Analysis_Syllabus.pdf
5	Introduction to Data Science	New Course	CMSC 491 to CMSC 462	New Course - converting CMSC 491 to CMSC 462	NewCourse_CMSC462_-_Intro_to_Data_Science.doc NewCourse_CMSC462_-_Intro_to_Data_Science_Syllabus.doc
6	Undergraduate Teaching Assistantship	New Course	CMSC 496	New Course	NewCourse_CMSC396_-_Undergraduate_Teaching_Assistantship.docx NewCourse_CMSC396_-_Undergraduate_Teaching_Assistantship_Syllabus.docx
7	Design and Analysis of Algorithms	Course Change	CMSC 441	Modify prerequisites and at least one of the following: (STAT 355, CMPE 320, or STAT 451) all with a grade of C or better.	Course_Change_CMSC441_Prerequisites.docx