CSEE 5590-0001/COMP-SCI 490-0001: Python/Deep Learning Programming

Spring 2022 | University of Missouri-Kansas City | School of Computing and Engineering | Applied Programming Learning Series

Instructor and TA details:

Instruction Team			
Coordinator	**Email**	**Office#**	**Office Hours**
Yugi Lee	leeyu@umkc.edu	FH #560D	Email arrangement
Instructors	**Email**	**Office#**	**Office Hour**
Albishri, Ahmed	aa8w2@umsystem.edu	FH #504	https://calendly.com/albishri/20min
TAs	**Email**	**Office#**	**Office Hour**
Alqarni, Saeed	saacfb@umsystem.edu	FH #504	https://calendly.com/saacfb/20min

Course Time and Location

Time: Friday 03:00 PM – 6:00 PM
Location:

- MNLC-Room 452

Credits: 3 Credit Hours

Description

APL Description: Each course in this APL series is for a graduate student or undergraduate (Senior) in the School of Computing & Engineering (SCE) who want to build programming skills in a specialized area. Students must have permission to enroll in any course of this series. The courses in this series will count to 3 credit hours toward fulfilling the course requirement for students' degrees at SCE.
Python/Deep Learning Programming Course Description: This course teaches students how Python (**Part 1**) and Deep Learning (**Part 2**) work as well as how to apply them to applications. Students will build applied programming skills using case studies from machine learning classification, Image classification, object detection and natural language processing. The programming language is Python.

Part 1 (Week 1 –8): Teaches programming skills useful to engineers and scientists. Learn how Python is used for machine learning applications. Prerequisites: There are no prerequisites for prior experience with computing tools required to perform projects. knowledge on R or MATLAB would be a good plus.
Part 2 (Week 9–16): learning programming for deep learning with Keras library. Learn the foundations of Deep Learning, understand how to build deep neural networks, optimization, and learn how to lead successful machine learning projects. Prerequisites: Prior knowledge and experience with Python.

Prerequisites
Prior knowledge and experience with any Programming will be helpful. A willingness to research and explore the given resources will be essential!

Required Textbook
The textbook is not necessary for this course as technology is rapidly changing. We will use online resources for this course. However, these books can be used as references
https://umkc.box.com/s/1pb65jq4psirnv6axayaolnuewqj3hv7

System Requirements
This course requires everyone to have a laptop. It is mandatory.
Make sure you have a working Camera as it might be needed for some of the quizzes or exams.

Technology Requirements
You are expected to have the computing resources necessary to complete this course through personal, University channels (e.g., remote computer labs) or both. Please contact me if you will be without email access for a short-term basis during this course. We can make alternate arrangements should your reason for being without computer access warrant an accommodation (note: travel for vacation/work does not necessitate accommodations).
Below is a list of some helpful computer requirements for full participation in this online class:

- The latest version of GitHub Desktop at https://desktop.github.com/
- The latest version of Pycharm IDE at https://www.jetbrains.com/pycharm/download/download-thanks.html?platform=windows&code=PCC
- The latest version of Anaconda package manager https://www.anaconda.com/products/individual(please download version suitable for your OS)
- A current word processing software
- A headset with microphone
- A webcam
- Firefox, Chrome, or Safari browser.
- A Broadband Internet connection is preferred. Examples of broadband Internet connection are high-speed DSL or a Cable modem

Participation Policies
This course is not designed to be self-paced. Rather, you are expected to participate in class activities along with the group. At the same time, I recognize that there might be times during the semester that you need to complete work in advance in order to meet other life demands.

Course Time Commitment
Courses, both in-person and online, can be varied in their design and expectations for student involvement and time. If this course were taught face-to-face during the 16-week session, one would expect to be in class (engaged in lecture and discussion) for approximately 3 hours/week and spend

additional time outside of class in preparation for active course engagement and course assessment (reading, completing assignments). So, you should be prepared to spend similar amounts of time engaged in this course in an online format. Compared to traditional face-to-face learning environments, you should anticipate that in this course, you will experience less time in passive learning activities (i.e., lecture). And more time engaged in active learning activities and communication with your peers and me (i.e., In-class programming (ICPs), Quizzes via Zoom, Proctorio, and discussion board postings).

Expectations of Faculty in this Course

We will aim to respond to all email questions within 48 hours. Questions that are posted to the General Questions Discussion Board will be answered within 24 hours. Weekly assignments will typically be graded by Monday of the following week. Exams, in general, will have a two-week grading turn-around timeframe. For some assignments, individual feedback will be provided, and for some assignments, group feedback will be provided.

Intended Learning Outcomes/Objectives

After finishing this course, you will have the knowledge to be able to write Machine Learning and Deep Learning programs

1. Complete the weekly In-class programming assignments (ICPs)
2. Complete weekly quizzes
3. Complete course project

Assignments

In-class programming (ICP)

1. ICPs are in a group of (2) max. contribution.
2. Accept the assignment, and private GitHub repo will be created for you, clone, and start working.
3. Once finished push your source code to your repo and explain the work through the ReadMe file properly. Make sure you add your student info in the ReadMe file.
4. Comment your code appropriately (show your understanding). IMPORTANT.
5. In class submissions are encouraged.
6. Make a simple video about 2 to 3 minutes which includes execution of the application and explanation of code snippets. (If not reviewed by TA).
7. ICPs deadline is Wedneday 11:59PM. Any submission after this deadline is considered as a late submission.
   (Check the Late Submission Policy on Assignments in the syllabus)

Quiz

1. Every 2 Weeks.
   - Quiz about Lectures.
   - Quiz about ICP.
2. The purpose of the quizzes is to help you to review the content quickly and learn from the lessons.
3. The quiz is an individual contribution
4. It consists of multiple-choice questions (MCQs), T/F, and fill blanks questions from the specific module

Quiz Submission Guidelines

1. The quiz will be available in Canvas
2. You will have to take the quiz at the specified time. (We will announce the time once we start with the lessons)
3. If you are not taking the quiz, you will not get the credit
4. There will not be any makeup quiz in case if you miss one of the quizzes

Project

The project is a team contribution; however, each member must attend the presentation otherwise they will not get the credit.

1. Work on the project with your team
2. Team Must create a GitHub repo for the project.
    a. The ReadMe file should include the below list but not limited to them
        - Title
        - Team Information
        - Short Description
        - Screenshots
3. Make a simple video about 5 to 10 minutes which includes execution of the application and explanation of code snippets (add this video to your project presentation and link in GitHub).
4. You will need to present the project and you will be asked individual questions.
5. The grading criteria for the project will include:
    a. Documentation (30%)
        - Final Paper Report
        - Code Documentation
    b. Presentation (20%)
    c. Hackathon Participation (20%)
    d. Understanding (30%)

Project Submission Guidelines

1. The project submission is with a team of (4) students max.
2. Submit your source code and documentation to GitHub, ReadMe file must have team information and short introduction.
3. Comment your code appropriately
4. Video submission (5 to 10 min video showing the demo of the project, with brief voiceover on the code explanation)
5. Submit a report to Turnitin in Canvas, and the similarity score should be less than 20%
6. Submission after the deadline considered a late submission. (Check the Late Submission Policy on Assignments in the syllabus)
7. The report should follow the IEEE format and should include the following details:
    a. Introduction
    b. Objectives
    c. Approaches/Methods
    d. Workflow
    e. Datasets (if applicable)
    f. Parameters (if applicable)
    g. Evaluation & Discussion (if applicable)
    h. Conclusion

Late Submission Policy on Assignments

Assignments that submitted after the due date will no longer be accepted unless permission was provided.
Late submission if accepted:
1 Day = -10%
2 Days = -20%

DO NOT EMAIL your work to TAs, always use the appropriate form to submit and your work should be original and independent.

Assignment	**Contribution**	**% of the Final Grade**	**Point Value**
ICPs (14)	Team of (2)	25%	90 points each
ICP Quizzes (7)	Individual	5%	10 points each
Quizzes (7)	Individual	10%	10 points each
Project (1)	Team of (4)	20%	100 points each
Exams (2)	Individual	40%	100 points each
Total	100%		

Grading

- A ≥ 94.0%
- A- ≥ 90.0%
- B+ ≥ 87.0%
- B ≥ 84.0%
- B- ≥ 80.0%
- C+ ≥ 77.0%
- C ≥ 74.0%
- C- ≥ 70.0%
- D+ ≥ 67.0%
- D ≥ 64.0%
- D- ≥ 60.0%
- F < 60.0%

Course Schedule

The following is the proposed course schedule. The schedule may be changed due to unforeseen circumstances. Please check the Canvas course site for the most current and up to date information

Lesson	Description	Tools/Technologies	ICP Due Dates (by 11:59 pm)
Week-1	Python Features, Applications, Installation, Python version, Data types, Operators, Conditional Statements	Python / PyCharm	Jan 26, 2022
Week-2	Loop structures, Tuples, Complex datatypes, Dictionary, Sets	Python / PyCharm	Feb 2, 2022
Week-3	Classes, Object Oriented Concepts, Inheritance, instances, Scientific packages, Python Functions, Web Scraping	BeautifulSoup/Python/ NumPy	Feb 9, 2022
Week-4	Introduction to machine learning, Terminology in machine learning, Data Analysis Regression	Python/PyCharm/ Jupyter Notebooks	Feb 16, 2022
Week-5	Data Analysis, Clustering	SciPy/Matplotlib/NumPy/ Jupyter Notebooks	Feb 23, 2022
Week-6	Data Analysis, Classification, Bias versus variance, evaluating model	scikit-learn (sklearn) /NumPy/SciPy/ Jupyter Notebooks	March 2, 2022
Week-7	Natural Language processing, Python NLTK package, Stemming, POS, Lemmatization, N-grams, Name entity recognition	NLTK/Python/ Jupyter Notebooks	March 9, 2022
Exam-1: March 11th (Friday): Python Lessons 1 – 7			
Week-9	Brief introduction to deep learning, Installation	Google Colab/ Jupyter Notebooks	March 23, 2022
Week-10	Constants, Basic operations, Tensor Ranks, Variables, Placeholders and feeding inputs, Lazy loading, TensorBoard, loss functions and Linear Regression.	PyCharm, Python, Keras, NumPy, matplotlib	April 6, 2022
Week-11	Neural Networks, Word2wec, Word Embedding, Name scopes	Python, Keras, NumPy, matplotlib, pandas, scikit-learn	April 13, 2022
Week-12	Artificial Neural Networks, types of artificial neural networks, activation function, types of activation functions and Image/Text classification with CNN.	Python, Keras, NumPy, matplotlib, pandas, scikit-learn	April 20, 2022
Week-13	Logic behind Activation functions, RNN, LSTM, Implementing Text Generator	Python, Keras, NumPy, matplotlib, pandas, scikit-learn	April 27, 2022
Week-14	Object Detection and Image segmentation.	Python, Keras, NumPy, SciPy	May 4, 2022
Exam-2: May-6 (Friday): Deep Learning Lessons 1 - 7			
Week-15: Project Presentation			

Rubric Detail

ICP

Criteria	Rating			Pts
ReadMe file Completed	**10 to >5.0 pts** **Excellent** Completed all the required information	**5 to >0.0 pts** **Good** Missing some information	**0 pts** **Fair** No Readme file	**10 pts**
Video/ Explanation	**20 to >10.0 pts** **Excellent** Video with all details and proper technical explanation	**10 to >0.0 pts** **Good** Missing proper information	**0 pts** **Fair** No video, No audio, No explanation	**20 pts**
Commenting the code	**10 to >5.0 pts** **Excellent** Appropriate comments	**5 to >0.0 pts** **Good** useful comments	**0 pts** **Fair** Not useful comments.	**10 pts**
Completeness of given assignment	**60 to >30.0 pts** **Excellent** It is completely solved in an efficient way	**30 to >0.0 pts** **Good** Partial solved	**0 pts** **Fair** No execution and solution for all the requirements	**50 pts**

Project Evaluation

Criteria	Novice	Competent	Proficient
ReadMe file Completed	Missing Student info. Missing Short Description. Missing Video link (if applicable). (>=70 to <=80)	Missing some information. (>=80 to <=90)	Meets all the ReadMe file requirement. (>=90 to <=100)
Video	No Video. (0)	Video missing proper explanation. No Audio. (>=50 to <=85)	Video with all details and proper technical explanation. (>=85 to <=100)
Report	Basic report. (>=80 to <=85)	Report on the required details. (>=85 to <=95)	Report with all details and making it easy to follow and understand Visually looking good. (>=90 to <=100)
Report similarity	>30 % (>=80 to <=85)	<30 % (>=85 to <=95)	<15 % (>=90 to <=100)
Completeness of given assignment	It is partially solved. (<=75)	Completely solved. (>=75 to <=95)	It is completely solved in an efficient way. (>=90 to <=100)
Commenting the code	Not useful comments. (<=70)	Appropriate comments. (>=70 to <=90)	Appropriate comments. (>=90 to <=100)
Code similarity	>50 % (>=50 to <=70)	<50 % (>=70 to <=90)	<30 % (>=90 to <=100)
Time of submission	Submission after the due date. Check the 'Late Submission Policy on Assignments' section in the syllabus	It is submitted on the deadline. No score will be deducted from the obtained score.	It is submitted on or before the deadline. No score will be deducted from the obtained score.
Presentation (Individual effort)	Basic presentation with not explaining the crucial details of the assignment. (>=80 to <=85)	Presentation with explaining the crucial details of the assignment. (>=85 to <=95)	Presentation with crucial details of the assignment comparing with a similar project. (>=90 to <=100)
Hackathon Participation	Project Submitted to Hackathon		

School of Computing and Engineering & University Policies

Resources & Policy Statements

https://info.umkc.edu/saem/wp-content/uploads/2016/04/UMKC-Student-Handbook.pdf

Academic Calendar

Students are encouraged to review important add, drop or withdraw dates:
https://calendar.umkc.edu/academic-calendar/

Academic Integrity

The Board of Curators of the University of Missouri recognizes that academic honesty is essential for the intellectual life of the University. Faculty members have a special obligation to expect high standards of academic honesty in all student work. Students have a special obligation to adhere to such standards. Academic dishonesty, including cheating, plagiarism or sabotage, is adjudicated through the University of Missouri Student Conduct Code and Rules of Procedures in Student Conduct Matters.

Academic Support and Mentoring

UMKC's office of Academic Support and Mentoring provides innovative support services and resources to ensure educational access and personal success for every student. For information on tutoring, student success seminars, and other information, please visit: https://www.umkc.edu/asm/

Attendance Policy

Students are expected to attend and participate in classes as indicated by the course modality (Classroom based, Online, etc. available on Pathway). For more information on course modalities, please visit: https://www.umkc.edu/registrar/policies-procedures/classroom-scheduling.html. In order to comply with federal regulations associated with eligibility rules for federal financial aid, students not attending/participating a course during the first three weeks of the term will be administratively dropped from the specific course. Advance notice of attendance policies of academic units and individual instructors should be given, and such notice should be in writing. Students should notify instructors of excused absences in advance, where possible. Students who have an excused absence are expected to make arrangements with instructors for alternative or make-up work. Such arrangements should be made in advance of the absence, where possible. Instructors should accommodate excused absences to the extent that an accommodation can be made that does not unreasonably interfere with the learning objectives of the course or unduly burden the instructor. Attendance policies shall be applied in a non-discriminatory manner. Enrollment as a student is required to attend any class unless otherwise pre-approved by the instructor. Instructors are responsible for verifying student attendance and participation within the first three weeks (16 week course) through the Attendance Verification Survey (administered through UMKC Connect) as well as maintain records of participation throughout the term so that the last date of attendance for students with recorded "F" or "W" final grades may be submitted.

Campus Safety

Inclement weather, mass notification, and emergency response guide:

http://www.umkc.edu/umkcalert/

UMKC Connect

Important information is available to undergraduate students in UMKC Connect accessed through Canvas. Throughout the term, students may receive emails regarding course grades or academic performance. Students are expected to address information posted in a timely fashion. This information may be shared with the student's Success Network made up of his or her academic advisor(s) and other campus resources so that UMKC may fully support the student's success.

Grade Appeal Policy

The University grade appeal procedure is available only for the review of allegedly capricious grading and not for review of the instructor's evaluation of the student's academic performance. Capricious grading, as that term is used here, comprises any of the following:

- The assignment of a grade to a particular student on some basis other than the performance in the course;
- The assignment of a grade to a particular student according to more exacting or demanding standards than were applied to other students in the course; (Note: Additional or different grading criteria may be applied to graduate students enrolled for graduate credit in 300- and 400-level courses.)
- The assignment of a grade by a substantial departure from the instructor's previously announced standards.

Privacy Policies

Privacy Policy: https://www.umkc.edu/web-policy/privacy.asp

Webcam Policy: https://www.umsystem.edu/ums/elearning/policies

Counseling Services and Student Health & Wellness

UMKC students may experience many challenges in their lives while attending college – stress, depression, suicidality, trauma, relationship issues, health concerns, etc. As your professor, I care about your success and well-being, and want to make you aware of some helpful resources on campus. UMKC Counseling Services (https://info.umkc.edu/counseling-services/), located at Brookside 51 Building, 5110 Oak Street, Suite 201, offers a wide range of supportive services to students. Appointments can be made by calling 816-235-1635. UMKC Student Health and Wellness (http://info.umkc.edu/studenthealth/), located at Brookside 51 Building, 5110 Oak Street, Suite 237, offers a full range of health care and promotion services. Appointments can be scheduled online or by calling 816-235-6133. The MindBody Connection (www.umkc.edu/mindbody) is located in the Student Union, room 413 and offers a variety of stress-reduction services.

Students are encouraged to review UMKC's Policy on Suicide Prevention Resources (https://info.umkc.edu/saem/wp-content/uploads/2019/10/UMKC-Suicide-Prevention-Policy.pdf), which provides resources, referral information, and training opportunities to help recognize signs of distress in yourself and your peers as well as how to make appropriate referrals for support and assistance.

Students may contact the UMKC Student HelpLine (816-235-2222 or https://info.umkc.edu/saem/helpline/) with any questions or concerns. Students may also utilize the Complaint Policy (https://info.umkc.edu/saem/helpline/student-complaint-policy/) to file a complaint online.

Student Disability Services

To obtain disability related accommodations and/or auxiliary aids, students with disabilities must contact Student Disability Services as soon as possible by calling 816-235-5612. Once verified, our office will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. For more information go to: https://info.umkc.edu/disability-services/.

Equal Opportunity & Educational Access

UMKC is committed to providing equal opportunities to all students without unlawful discrimination on the basis of a protected identity, or their race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, or any other status protected by applicable state or federal law.

Discrimination & Harassment: Compliance with UM System Collected Rules and Regulations (CRRs) 600.000 is monitored by the Office of Affirmative Action (https://info.umkc.edu/title9/), but it is the responsibility of the entire university community to provide equal opportunity through relevant practices, initiatives, and programs. If you or someone you know has experienced discrimination or harassment based on their protected identity, we encourage you to visit Making a Report.

CRR 600.010 prohibits protected identity discrimination and harassment as well as sexual harassment and sexual misconduct by a student, employee, volunteer, or visitor that is not prohibited under CRR 600.020 and Title IX (see below), and that occurs within a UMKC educational program or activity, on- or off-campus, including when the conduct occurs off-campus and interferes with or limits the ability of any person to participate in or benefit from UMKC's educational programs or activities or employment. For those who have experienced discrimination or harassment, please see the Support and Connections pages of our Equity & Title IX website for a list of campus and community support services.

Sexual Harassment under Title IX: UM System Collected Rules and Regulations (CRRs) 600.020 prohibits all students, employees, volunteers, and visitors from engaging in sexual harassment, including sexual assault, dating violence, domestic violence, and stalking, in a university education program or activity against a person in the United States. If you or someone you know has experienced any of these forms of prohibited conduct, please visit the Support and Connections pages of our Equity & Title IX website for a list of support services on campus and in the community. For information on how to make a report to the university, visit Making a Report.

Failure to Accommodate Students with Disabilities: UM System Collected Rules and Regulations (CRRs) 600.010 prohibits discrimination against students with disabilities and ensures these students receive educational accommodations as issued by Student Disability Services. If you believe an employee of the university has failed to accommodate your disability, visit Making a Report.

Accommodating Pregnancy & Related Conditions: UMKC provides reasonable accommodations to students related to pregnancy and childbirth, including adjustments to attendance requirements, course due dates, leaves of absence, and other accommodations. If you have questions or would like to request arrangements, please visit Pregnancy & Related Accommodations.

Mandated Reporting: Nearly all UMKC employees, including your course instructors, advisors, and other support staff, are required to report all information related to any known or suspected discrimination, harassment, or sexual misconduct to the Office of Affirmative Action and cannot offer confidentiality. However, students may seek confidential support from RISE: Resources, Intervention, Support, & Education, Counseling Services, and Student Health & Wellness.

Employees of these offices are exempt from mandated reporting so long as the disclosure of prohibited conduct occurs in a confidential communication while they are acting as support advocates, professional counselors, or medical personnel. An exemption does not extend to these employees when the disclosure is made in non-confidential setting. If you have a question about confidentiality when making a disclosure to RISE, Counseling Services, or Student Health & Wellness, you should first ask whether the exemption applies.

Right to Free Expression

It is vitally important for UMKC to foster and maintain an educational environment that promotes free discussion, inquiry and expression by students inside the classroom and beyond, without fear that their exercise of such rights will have negative repercussions in areas over which the university has responsibility. It is equally important that students understand the narrow line separating their First Amendment rights and the legal and privacy rights of others so that students can exercise those rights within appropriate boundaries.

Per UM System Collected Rules and Regulations (CRRs) 200.015 your instructors should encourage free discussion, inquiry, and expression in courses, conferences and meetings. Student performance shall be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards.

Classroom Expectations: In exercising your right to free expression, UMKC requests students adhere to these five guidelines:

- Share responsibility for including all voices in the conversation, leaving sufficient time for others to engage in the discussion. Listen respectfully, avoiding interruptions or distractions.
- Recognize how your own identity and experiences inform your opinions and reactions to others. Be open to changing your perspectives when exposed to the ideas of others.
- Speak with care, acknowledging that your words may be perceived as disrespectful, marginalizing, biased, or harmful.
- Understand that everyone makes mistakes; view these mistakes as valuable in the learning process. Notice your own defensive reactions, and channel them into furthering a productive discussion.
- Differentiate between safety and comfort; accept discomfort as necessary for learning and exploring ideas through a social justice lens.

Although your right to free expression is protected, your instructors have the authority to take action under CRR 200.010 when they believe the conduct of any student unreasonably disrupts the classroom environment and prevents others from learning or threatens or endangers the health or safety of any person. If you feel your instructor was in error in taking action under CRR 200.010 related to your right to free expression, visit Making a Report.

Expressions of Perceived Bias

UMKC is committed to equity, diversity, inclusion and respectful interaction. In support of our campus community, the university provides the opportunity for students, employees, volunteers, and visitors to report expressions of perceived bias and to request UMKC respond to such expressions.

An expression of perceived bias may occur when someone believes that they have been subjected to harassment, bullying, stereotyping, microaggressions, abuse, marginalization, or any other form of targeted misconduct because they identify or are associated with a particular group. If you believe you have experienced an expression of bias or you become aware of such an expression, visit Making a Report.

Support: If the conduct of others prevents you from fully participating in the classroom or in university activities, UMKC offers confidential support through Counseling Services and RISE: Resources, Intervention, Support, & Education. Additional campus and community support services are listed on the Support and Connections pages of our Equity & Title IX website.