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## SYLLABUS

### MSUIIT Vision

*A research university committed to the holistic development of the individual and society.*

### MSUIIT Mission

*To provide quality education for the sustainable development of the nation and the global community.*

### Program Educational Objectives:

1. Practice Computer engineering as engineers, academicians, technopreneurs, innovators, and/or researchers in their

*chosen field of expertise in the areas of computer and electronics systems, embedded systems, software systems, and networking technologies.*

2. Attain professional growth and advancement in their professional career.
3. Engage in lifelong learning for continuous professional development.

### Program Outcomes:

## 1. Course Information

Course Code:	COE190
Course Title:	EMERGING TECHNOLOGIES IN CPE
Description:	This course is designed to provide flexibility in the curriculum by discussing any emerging technologies applicable to computer engineering.
Credits:	3 units (lec)
Modality:	Blended/Flexible
Contact Hours:	3 hours per week
Pre-requisite / Co-requisite:	EEE184 Microprocessors and Microcontroller Systems EEE184.1 Microprocessors and Microcontroller Systems Laboratory
A.Y. and Semester:	2025-2026; 1 <sup>st</sup> Semester

## 2. Alignment of Program Educational Objectives (PEOs) to the University Vision and Mission

PEO	ALIGNMENT WITH UNIVERSITY VISION	ALIGNMENT WITH UNIVERSITY MISSION
<b>PEO 1:</b> Practice Computer Engineering as engineers, academicians, technopreneurs, innovators, and/or researchers in their chosen field of expertise in the areas of computer and electronics systems, embedded systems, software systems, and networking technologies.	Underpins the university's vision by fostering Computer Engineering professionals who drive "research" and "innovation" for both individual advancement and societal progress.	Contributes to the university's mission of providing "quality education" by nurturing Computer Engineering professionals for the "sustainable development of both the nation and the global community".
<b>PEO 2:</b> Attain professional growth and advancement in their professional career.	Aligns by empowering individuals to achieve "professional growth" and "career advancement" that contribute to both holistic personal fulfillment and societal betterment.	Supports by producing Computer Engineering graduates who are equipped to lead and innovate "in their professional career", who contribute advancement to the nation and the global community.
<b>PEO 3:</b> Engage in lifelong learning for continuous professional development.	Strengthens the vision through a commitment to "lifelong learning", which keeps Computer Engineering graduates at the forefront of knowledge.	Reinforces "quality education" and "sustainable development" by promoting "lifelong learning and continuous professional growth" to equip Computer Engineering graduates for evolving global and national challenges.



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A. To keep abreast of latest developments in the specific field of practice

B. Effectively communicate using English and Filipino, orally and in writing

C. Work effectively and independently in multi-disciplinary and multi-cultural teams (PQF Level 6 descriptor)

D. Demonstrate professional, social, ethical, and environmental responsibility

E. Preserve and promote "Filipino historical and cultural heritage" (based on RA 7722)

F. Advocate for peace in multi-cultural settings

**Program Outcomes Common to all engineering programs in MSU-IIT**

G. Demonstrate inclination towards innovation and technopreneurship

**Program Outcomes Specific to BSCpE**

H. Ability to apply knowledge of mathematics, physical, life and information

### 3. Alignment of Program Educational Objectives (PEOs) to Program Outcomes (POs)

Program Educational Objectives (PEOs)	Program Outcomes (Pos)																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
<b>PEO 1:</b> Practice Computer Engineering as engineers, academicians, technopreneurs, innovators, and/or researchers in their chosen field of expertise in the areas of computer and electronics systems, embedded systems, software systems, and networking technologies.	✓			✓			✓	✓	✓	✓	✓	✓			✓			✓		✓
<b>PEO 2:</b> Attain professional growth and advancement in their professional career.		✓	✓										✓	✓						
<b>PEO 3:</b> Engage in lifelong learning for continuous professional development.				✓	✓	✓										✓	✓		✓	✓

### 4. Alignment of Course Outcomes (COs) to Program Outcomes (POs)

Course Outcomes (COs)	Program Outcomes (POs)																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
CO1: Apply fundamental Python programming concepts to perform basic and advanced exercises.																	E			
CO2: Implement image processing techniques using OpenCV and MediaPipe libraries.																	E			
CO3: Implement machine learning and deep learning models using Scikit-learn and PyTorch libraries.																	E			
CO4: Develop a functional prototype of an AI-based application.																	E			E



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sciences; and engineering sciences appropriate to computer engineering (CMO 87 S. 2017, PO-a).

I. An ability to design and conduct complex experiments, as well as to analyze and interpret data (CMO 87 S. 2017, PO-b).

J. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards (CMO 87 S. 2017, PO-c)

K. Ability to function on multidisciplinary teams (CMO 87 S. 2017, PO-d)

L. Ability to identify, formulate, and solve engineering problems (CMO 87 S. 2017, PO-e)

M. Understanding of professional and ethical responsibility (CMO 87 S. 2017, PO-f)

N. Ability to communicate effectively (CMO 87 S. 2017, PO-g)

## 5. Course Outline

Week	Topics	Lesson Learning Outcome (LLO)	Course Outcomes				Teaching Learning Activities / Methodologies	Learning Resources	Assessment
			CO1	CO2	CO3	CO4			
1	Virtual Environments and Integrated Development Environments - Anaconda Platform - Visual Studio Code IDE	At the end of the topic, the student can prepare his/her programming environment.	✓				<ul style="list-style-type: none"><li>Lecture</li><li>Reading assignment</li><li>Forum: discussion, problem-solving, analysis</li></ul>	<ul style="list-style-type: none"><li>Lecture Module</li><li>GitHub Documentation</li><li>Recorded videos in MOLE</li></ul>	Programming Exercise
2	Python Basics - Operators - Strings - Typecasting - Built-in functions - Selection structures - Iterative structures - Lists - Tuples - Sets - Dictionaries - Functions	At the end of the topic, the topic can apply fundamental Python programming concepts to perform basic exercises.	✓				<ul style="list-style-type: none"><li>Lecture / Demonstration</li><li>Structured exercises</li><li>Guided programming</li><li>Reflective practice</li><li>Forum: discussion, problem-solving, analysis</li></ul>	<ul style="list-style-type: none"><li>Google Colaboratory Notebook</li><li>GitHub Documentation</li><li>Virtual Programming Lab in MOLE</li></ul>	Programming Exercise on Python Syntax and Logic
3	Advanced Python - NumPy - Pandas - Matplotlib - Seaborn	At the end of the topic, the topic can apply fundamental Python programming concepts to perform advanced exercises.	✓				<ul style="list-style-type: none"><li>Lecture / Demonstration</li><li>Structured exercises</li><li>Guided programming</li><li>Reflective practice</li><li>Forum: discussion, problem-solving, analysis</li></ul>	<ul style="list-style-type: none"><li>Google Colaboratory Notebook</li><li>GitHub Documentation</li><li>Virtual Programming Lab in MOLE</li></ul>	Programming Exercise on Python Syntax and Logic
4-5	Image Processing with OpenCV - Loading and displaying images - Saving images - Image basics	At the end of the topic, the student can implement Python programs to perform image processing using the OpenCV library.		✓			<ul style="list-style-type: none"><li>Lecture / Demonstration</li><li>Structured exercises</li><li>Guided programming</li><li>Reflective practice</li><li>Forum: discussion, problem-solving, analysis</li></ul>	<ul style="list-style-type: none"><li>Google Colaboratory Notebook</li><li>GitHub Documentation</li><li>Virtual</li></ul>	<ul style="list-style-type: none"><li>Programming Exercises</li><li>Mini-project applying Image Processing Techniques</li></ul>



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<p><i>O. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (CMO 87 S. 2017, PO-h)</i></p> <p><i>P. Recognition of the need for, and an ability to engage in life-long learning (CMO 87 S. 2017, PO-i)</i></p> <p><i>Q. Knowledge of contemporary issues (CMO 87 S. 2017, PO-j)</i></p> <p><i>R. Ability to use techniques, skills, and modern engineering tools necessary for engineering practice (CMO 87 S. 2017, PO-k)</i></p> <p><i>S. Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments (CMO 87 S. 2017, PO-l)</i></p> <p><b>Additional Outcome as a State University as Stipulated in CMO 46 s. 2012</b></p> <p><i>T. Ability to generate new knowledge in the form of research or developmental</i></p>		<ul style="list-style-type: none"> <li>- Drawing shapes</li> <li>- Image transformations</li> <li>- Smoothing and blurring</li> <li>- Thresholding</li> <li>- Gradients and edge detection</li> <li>- Contours</li> <li>- Haar Cascades</li> <li>- Coin Counting</li> <li>- Color Tracking</li> </ul>						Programming Lab in MOLE	
	6	Sample Use Cases of Image Processing with MediaPipe <ul style="list-style-type: none"> <li>- Face Tracking</li> <li>- Eye Tracking</li> <li>- Hand Detection</li> <li>- Hand Gesture Detection</li> <li>- Facial Emotion Recognition</li> <li>- Gender and Age Recognition</li> <li>- Pose Estimation</li> </ul>	At the end of the topic, the student can implement Python programs to perform image processing with MediaPipe library.		✓		<ul style="list-style-type: none"> <li>• Lecture / Demonstration</li> <li>• Structured exercises</li> <li>• Guided programming</li> <li>• Reflective practice</li> <li>• Forum: discussion, problem-solving, analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Google Colaboratory Notebook</li> <li>• GitHub Documentation</li> <li>• Virtual Programming Lab in MOLE</li> </ul>	<ul style="list-style-type: none"> <li>• Programming Exercises</li> <li>• Mini-project applying Image Processing Techniques</li> </ul>
	7-8	Machine Learning Basics <ul style="list-style-type: none"> <li>- Workflow</li> <li>- Classification on Numerical Dataset</li> <li>- Regression on Numerical Dataset</li> <li>- Clustering on Numerical Dataset</li> </ul>	At the end of the topic, the student can implement machine learning models using the Scikit-learn library.			✓	<ul style="list-style-type: none"> <li>• Lecture / Demonstration</li> <li>• Structured exercises</li> <li>• Guided programming</li> <li>• Reflective practice</li> <li>• Forum: discussion, problem-solving, analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Google Colaboratory Notebook</li> <li>• GitHub Documentation</li> <li>• Virtual Programming Lab in MOLE</li> </ul>	<ul style="list-style-type: none"> <li>• Programming Exercises</li> <li>• Case Study Write-up and Demonstration</li> </ul>
	9-10	Sample Use Cases of Deep Learning <ul style="list-style-type: none"> <li>- Deep Learning in Computer Vision</li> </ul>	At the end of the topic, the student can implement deep learning models using the PyTorch library.			✓	<ul style="list-style-type: none"> <li>• Lecture / Demonstration</li> <li>• Structured exercises</li> <li>• Guided programming</li> <li>• Reflective practice</li> </ul>	<ul style="list-style-type: none"> <li>• Google Colaboratory Notebook</li> <li>• GitHub</li> </ul>	<ul style="list-style-type: none"> <li>• Programming Exercises</li> <li>• Case Study Write-up and</li> </ul>



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*projects to support  
national, regional or local  
developmental plans.*

	<ul style="list-style-type: none"><li>- Convolutional Neural Networks</li><li>- Image Classification</li><li>- Object Detection</li><li>- Instance Segmentation</li></ul>						<ul style="list-style-type: none"><li>• Forum: discussion, problem-solving, analysis</li></ul>	Documentation <ul style="list-style-type: none"><li>• Virtual Programming Lab in MOLE</li></ul>	Demonstration
13-14	Applications of Artificial Intelligence	At the end of the topic, the student can develop and present his/her project on the real-world application of Artificial Intelligence to an international audience.				✓	<ul style="list-style-type: none"><li>• Structured exercises</li><li>• Guided programming</li><li>• Reflective practice</li><li>• Forum: discussion, problem-solving, analysis</li></ul>	<ul style="list-style-type: none"><li>• Google Colaboratory Notebook</li><li>• GitHub Documentation</li><li>• Virtual Programming Lab in MOLE</li></ul>	<ul style="list-style-type: none"><li>• Capstone Project Prototype</li><li>• Capstone Project Presentation to Collaborative Online International Learning (COIL), an international extension activity with Kyushu Sangyo University, Japan</li></ul>



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6. Grading System

Point Range	Grade	Assessment	Grade Weight
95.556 - 100	1.00	Programming Exercises	40%
91.110 - 95.555	1.25	Mini-projects and Case Study Write-ups	10%
86.665 - 91.109	1.50	Capstone Project Prototype	20%
82.219 - 86.664	1.75	Capstone Project Presentation	30%
77.774 - 82.218	2.00	(Mastery Requirement: 60%)	
73.328 - 77.773	2.25		
68.883 - 73.327	2.50		
64.437 - 68.882	2.75		
59.992 - 64.436	3.00		
0.000 - 59.991	5.00		

7. References

1. Artificial and Cognitive Computing for Sustainable Healthcare Systems in Smart Cities (Wiley Online, 2024)
2. The Impact of Automatic Control Research on Industrial Innovation: Enabling a Sustainable Future (Wiley Online, 2023)
3. Data Exfiltration Threats and Prevention Techniques: Machine Learning and Memory-Based Data Security (Wiley Online, 2023)
4. Emerging Computing Paradigms: Principles, Advances and Applications (Wiley Online, 2022)
5. Data Mining and Machine Learning Applications (Wiley Online, 2022)
6. AI and Machine Learning for Network and Security Management (Wiley Online, 2022)
7. Cybersecurity and Local Government (Wiley Online, 2022)
8. Optimization and Machine Learning: Optimization for Machine Learning and Machine Learning for Optimization (Wiley Online, 2022)



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9. Network Science: Analysis and Optimization Algorithms for Real-World Applications (Wiley Online, 2022)
10. Emerging Extended Reality Technologies For Industry 4.0: Early Experiences with Conception, Design, Implementation, Evaluation and Deployment (Wiley Online, 2020)

## 8. Classroom Policies

1. Your instructor may or may not explicitly check attendance every day. However, if you are caught exceeding your allowable cuts for the semester, you may be given a grade of 5.00 or DRP.
2. In case you cut, it will be your responsibility to know the material covered for the day. The instructor reserves the right to give unannounced quizzes or graded lab exercises at any time.
3. No makeup tests will be given unless you can present a medical certificate or an immediate member of your family died. Make up tests will solely be at the teacher's discretion.
4. Playing games is strictly prohibited during class hours. Web browsing and doing email are also prohibited, unless done in connection with the current lecture or lab topic and allowed by the teacher.
5. Use of communication devices is prohibited during class hours. Please turn them off during class.
6. Class requirements are due during class hours, unless otherwise specified. Late submission will merit deductions as specified by the teacher. If you fail to submit the activity after 7 calendar days, you will be marked as zero in that activity.
7. Cheating will not be tolerated. Cheating in any requirement will result in a minimum penalty of having a grade of 0 for that requirement. Duplicated projects/lab exercises will merit penalties for both the student who copied and the student from whom the work was copied.
8. Additional policies, with due consultation with the students, may be implemented by the teacher to adapt to the class environment. Students are advised to be aware of such updates, and to ask their instructor if anything is unclear.
9. There will be no INC grade due to the strict schedule of the capstone project output presentation and the COIL presentation.

## Civility in the Classroom

Students are expected to assist in maintaining a classroom environment that is conducive to learning. To ensure that all students have the opportunity to gain from time spent in class, faculty members are encouraged to include a statement in their course syllabi relating to behavioral expectations in the classroom.

## Students with Disabilities

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as possible to make necessary arrangements. Students must present appropriate verification from the Institute Clinic during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Institute Clinic has been provided.



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## 9. Approval

Prepared by:	Approved:	
<b>EARL RYAN M. ALELUYA</b>	<b>FRANCIS JANN A. ALAGON</b>	<b>JEFFERSON A. HORA, Ph.D.</b>
Faculty Member	Department Chairperson	College Dean

## 10. Learning Contract

I have read the course syllabus and I understand that I have to comply with the requirements of the course and the expectations from me as a student of COE190, during the 1st Semester, AY 2025-2026. I am fully aware of the consequences of non-compliance with the above-mentioned requirements and expectations.

  
**Karl Richie B. Vacalares**

Printed Name and Signature of Student

Date: 8/31/2025\_\_\_\_\_