Program Learning Outcomes: Definition, Alignment and Assessment
Computer Engineering Department

Graduate Program

1. Program Learning Outcomes:

The Program Learning Outcomes (PLOs) for the Computer Engineering Graduate Program are defined as follows:

1. Fundamental knowledge and understanding of computer systems.
2. Ability to apply computer systems knowledge and understanding to solve real-world problems.
3. Ability to conduct research in an area of computer engineering advancing scientific knowledge.
4. Ability to communicate concepts, research goals and results.
5. Knowledge and understanding of ethical standards in proposing, executing, and communicating scientific research.

Based on the definitions listed above, the PLOs for the Computer Engineering **MSc degree** are:

1. Proficiency with fundamental knowledge and understanding of computer systems.
2. Proficiency in applying computer systems knowledge and understanding to solve real-world problems.
3. Proficiency in conducting research in an area of computer engineering advancing scientific knowledge.
4. Proficiency in communicating concepts, research goals and results.
5. Knowledge and understanding of ethical standards in proposing, executing, and communicating scientific research.

The PLOs for the Computer Engineering **PhD degree** are:

1. Mastery of fundamental knowledge and understanding of computer systems.
2. Mastery in applying computer systems knowledge and understanding to solve real-world problems.
3. Mastery in conducting research in an area of computer engineering advancing scientific knowledge.
4. Mastery in communicating concepts, research goals and results.
5. Knowledge and understanding of ethical standards in proposing, executing, and communicating scientific research.
6. Ability to conduct independent research.

2. Curriculum Alignment:

Assessment Data Sources	M.S. & Ph.D. Program Learning Outcomes (PLOs)					Ph.D. Only
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CMPE 200: Research and Teaching in Computer Science and Engineering (Core class)				X	X	
CMPS 201: Analysis of Algorithms (Core class)	X	X				
CMPE 202: Computer Architecture (Core class)	X	X				
CMPE 215: Models of Robotic Manipulation	X	X				
CMPE 216: Bio-inspired Locomotion	X	X				
CMPE 218/L: Mechatronics	X	X				
CMPE 220: Advanced Parallel Processing	X	X				
CMPE 221/L: Advanced Microprocessor Design	X	X				
CMPE 222: VLSI Digital System Design	X	X				
CMPE 223: VLSI System-on-a-Chip Design	X	X				
CMPE 224: Testing Digital Circuits	X	X				
CMPE 225: Introduction to ASIC Systems Design	X	X				
CMPE 226: Computer-Aided Analysis of Electrical Circuits	X	X				
CMPE 229: Field-Programmable Gate Arrays Computer-Assisted Design	X	X				
CMPE 230: Computer Performance Evaluation	X	X				
CMPE 231: Human-Computer Interaction	X	X				
CMPE 232: Arithmetic Processors	X	X				

Assessment Data Sources	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CMPE 233: Human Factors	X	X				
CMPE 235: User Evaluation of Technology	X	X				
CMPE 240: Introduction to Linear Dynamical Systems	X	X				
CMPE 241 Feedback Control	X	X				
CMPE 242: Applied Feedback Control	X	X				
CMPE 243: System Identification	X	X				
CMPE 244: Digital Control	X	X				
CMPE 246: Hybrid Dynamical Systems	X	X				
CMPE 248: Games in Design and Control	X	X				
CMPE 250: Multimedia Systems	X	X				
CMPE 251: Error-Control Coding	X	X				
CMPE 252A: Computer Networks	X	X				
CMPE 252B: Principles of Computer Communication	X	X				
CMPE 253: Network Security	X	X				
CMPE 254: High Speed Computer Networks	X	X				
CMPE 256: Design Project in Computer Networks	X	X	X	X	X	
CMPE 257: Wireless and Mobile Networks	X	X				
CMPE 258: Unix Networking Internals	X	X				
CMPE 259: Sensor Networks	X	X				

Assessment Data Sources	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CMPE 263: Data Compression	X	X				
CMPE 264: Image Analysis and Computer Vision	X	X				
CMPE 276: Software Engineering	X	X				
CMPE 277: Graph Algorithms	X	X				
CMPE 278: Introduction to the Theory of Discrete Systems	X	X				
CMPE 280 Seminar Series			X	X	X	
CMPE 290 and 293 Special Topics Series	X	X	X	X		
CMPE 296 Master Project	X	X	X	X	X	
CMPE 297 Independent Study	X	X	X	X	X	
CMPE 299 Thesis Research	A	A	A	A	A	A
Advancement to Candidacy (Ph.D. only)	A	A	A	A	A	A
Thesis Defense (Ph.D. only)	A	A	A	A	A	A
M.S. or Ph.D. Thesis	A	A	A	A	A	A

X= Data is collected for PLO assessment, A= Students demonstrate PLO, and assessment evidence is collected

3. Assessment Plan:

In their first year, graduate students (both M.S. and Ph.D.) must show basic knowledge in three fundamental subjects: 1) computer algorithms and data structures; 2) computer architecture; and 3) one of the following three subjects—logic design, circuits, or software systems. Basic knowledge can be demonstrated by either completing one of the associated undergraduate courses, by establishing that an equivalent undergraduate course has been completed elsewhere, or by passing the final examination (or project when deemed appropriate by the responsible faculty) of an appropriate course (PLOs 1 and 2).

All CE graduate students (both M.S. and Ph.D.) must complete a set of *core classes,* which address PLOs 1 and 2. As part of the *core classes*, CE graduate students are also required to take the Research and Teaching in Computer Science and Engineering class, which addresses PLOs 4 and 5. In addition, CE graduate students must take a set of graduate classes in CE and in the School of Engineering which support PLOs 1, 2, and 3. CE M.S. and Ph.D. students also take research units in the

form of Independent Study or Thesis Research. The latter support PLOs 3, 4, 5, and 6.

For M.S. students, the M.S. thesis (for the Thesis track) or the M.S. project (for the Project track) fulfill PLOs 3, 4, and 5. Ph.D. students must pass the *candidacy exam* (PLOs 3, 4, 5, and 6) by presenting to a faculty committee their thesis proposal. Finally, defending and filing the PhD thesis addresses PLOs 3, 4, 5, and 6.