Cavalla International University

COURSE PROGRAM STRUCTURE/STUDENT CHECKLIST

PROGRAM OF STUDY: ☐ MS in Computer Engineering; ☐ Combined BS/MS in Computer Engineering; ☐ MS in Cybersecurity; ☐ Combined BS/MS in Electrical Engineering; ☐ MS in Mechanical and Systems Engineering; ☐ MS in Materials Science and Engineering; ☐ Combined BS/MS in Materials Science and Engineering; MS in Mechanical and Software Engineering; ☐ MS in Chemical and Biomolecular Engineering; ☐ MS in Artificial Intelligence Engineering; ☐ MS in AI Software and Systems Engineering; ☐ MS in Data Science; ☐ MS in Data Engineering; ☐ MS in Biomedical Engineering; ☐ MS in Bioengineering Innovation and Design; ☐ MS in Civil and Systems Engineering; ☐ MS in Computer Science.

The program is structured to be completed in **18 Months – 2 years**. Students enrolled in accelerated programs can complete their degrees in 9 – 12 months. Please contact the admissions office if you have any questions: **admissions@cavallauniversity.education**. **Required Core Course (39 CREDITS): 18 Credit Hours; General & Specialized Electives: 15 Credit Hours; Research Thesis/Capstone: 6 Credits**

MASTER OF SCIENCE (MS) PROGRAM – FIRST YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
MAS 400	Introduction to Master Studies	**3**	
MAS 401	Research Methods – Design & Analysis	**3**	
MAS 402	Specialized Topic 1 in Students Area of Study	**3**	
MAS 403	Quantitative Research	**3**	
MAS 404	Specialized Topic II in Students Area of Study	**3**	
Total		**15**	

MASTER OF SCIENCE (MS) PROGRAM- SECOND YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
MAS 405	Qualitative Research	**3**	
	Specialized Electives	**3**	
	Specialized Electives	**3**	
	Specialized Electives	**3**	
Total		**12**	

Note: The University encourages students to engage in their third year in a capstone learning experience: advanced seminars, clinical practice, and writing projects that call on students to use the full extent of their knowledge, skills, and methodological tools in a field to address the most interesting and complicated legal problems of today.

MASTER OF SCIENCE (MS) PROGRAM – Computer Engineering **Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.**			
Course No.	**Course**	**Credit(s)**	**Grade**
MCE 400	Applied Master Studies in Computer Engineering	**3**	
MCE 401	Computer Science Theory and Applications	**3**	
MCE 402	Artificial Intelligence Engineering	**3**	
MCE 403	Organization of Programming Languages	**3**	
MCE 404	Algorithms	**3**	
MCE 405	Operating Systems	**3**	
MCE 406	Digital Computer Design	**3**	
MCE 407	Software Engineering Requirements	**3**	
MCE 408	Systems Engineering Requirements	**3**	
MCE 409	Computer Science Theory and Applications	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Cybersecurity			
Course No.	**Course**	**Credit(s)**	**Grade**
MCY 423	Applied Master Studies in Cybersecurity	**3**	
MCY 424	Advanced Probability & Statistics	**3**	
MCY 425	Advanced Data/Database Security	**3**	
MCY 426	Advanced Security Coding & Encryption	**3**	
MCY 427	Cyber Threat of National Security Technology	**3**	
MCY 428	Operating and Network Defense	**3**	
MCY 429	Cybersecurity Planning & Policy	**3**	
MCY 430	Security Audit & Assessments	**3**	
MCY 431	Cyber Threat of Artificial Intelligence	**3**	
MCY 432	Advanced Digital Forensics	**3**	

MASTER OF SCIENCE (MS) PROGRAM – THIRD YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
	Specialized Electives	**3**	
	Specialized Electives	**3**	
Total		**6**	

MASTER OF SCIENCE (MS) – FOURTH YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
MAS 411	Research Capstone	**3**	
MAS 412	Research Thesis	**3**	
Total		**6**	

MASTER OF SCIENCE (MS) PROGRAM – Mechanical & Systems Engineering			
Course No.	**Course**	**Credit(s)**	**Grade**
MSE 451	Applied Master Studies in Mechanical & Systems Engineering	**3**	
MSE 452	Effective and Economic Design for Biomedical Instrumentation	**3**	
MSE 453	Applied Computational Modeling in Aerodynamics and Heat Transfer	**3**	
MSE 454	Orientation Mapping of Crystalline Materials	**3**	
MSE 455	Haptic Interface Design for Human-Robot Interaction	**3**	
MSE 456	Mechanics of Flight Risk & Human Factors	**3**	
MSE 457	Advanced Fluid Mechanics	**3**	
MSE 458	Advanced Finite Element Analysis	**3**	
MSE 459	Fabrication of Biomaterials, Engineered Tissues and Food	**3**	
MSE 460	Modern Tools and Applications in Experimental Solid Mechanics	**3**	
MSE 461	Advanced Manufacturing Engineering Theory	**3**	
MSE 462	Advanced Manufacturing Engineering Laboratory	**3**	
MSE 463	Nonlinear Control and Planning in Robotics	**3**	
MSE 464	Learning-Based Control for Robotics	**3**	
MSE 465	Advanced Manufacturing Engineering	**3**	
MSE 466	Robot System Programming	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Electrical Engineering **Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.**			
Course No.	**Course**	**Credit(s)**	**Grade**
MEE 430	Applied Master Studies in Electrical Engineering	**3**	
MEE 431	Artificial Intelligence Electrical Engineering	**3**	
MEE 432	Machine Intelligence on Embedded Systems	**3**	
MEE 434	Electrical Engineering Theory and Applications	**3**	
MEE 435	Digital Signal Processing	**3**	
MEE 436	Computer & Electrical Engineering in Cybersecurity	**3**	
MEE 437	Introduction to Optical Instruments	**3**	
MEE 438	Advanced Optical and Optoelectronic Instruments and Devices	**3**	
MEE 439	Computation for Engineers	**3**	
MEE 440	Advanced Software Engineering Requirements	**3**	
MEE 441	Principles of Complex Networked Systems	**3**	
MEE 442	Bioelectricity from Neurons to Semiconductors	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Material Science & Engineering **Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.**			
Course No.	**Course**	**Credit(s)**	**Grade**
MCS 441	Applied Master Studies in Material Science & Engineering	**3**	
MCS 442	Cybersecurity Systems in MSE	**3**	
MCS 443	Advanced Physical Chemistry of Materials	**3**	
MCS 444	Micro and Nano Structured Materials & Devices	**3**	
MCS 445	Physical Metallurgy	**3**	
MCS 446	X-ray Scattering, Diffraction, and Imaging	**3**	
MCS 447	Materials Science Fundamentals for Batteries	**3**	
MCS 448	Chemistry and Physics of Polymers	**3**	
MCS 449	Biomaterials for Cell Engineering	**3**	
MCS 450	Electroanalytical Chemistry & Energy Conversion	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Artificial Intelligence Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MAI 427	Applied Master Studies in Artificial Intelligence Engineering	**3**	
MAI 428	Technology Ethics and the Legal Landscape	**3**	
MAI 429	Machine Learning for Data Science	**3**	
MAI 430	Artificial Intelligence in Organizational Leadership	**3**	
MAI 431	Natural Language Processing	**3**	
MAI 432	Internet & Web Systems Engineering	**3**	
MAI 433	Software and Systems Engineering	**3**	
MAI 434	Advanced Systems Engineering Analysis and Design	**3**	
MAI 435	Advanced Human-Robot and AI Interaction	**3**	
MAI 436	Computer Vision & Computational Engineering	**3**	
MAI 437	Artificial Intelligence Engineering Practicum	**3**	
MAI 438	Advanced Design of Artificial Intelligence Products	**3**	

MASTER OF SCIENCE (MS) PROGRAM – AI Software & Systems Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
SSE 407	Applied Master Studies in AI Software & Systems Engineering	**3**	
SSE 408	Systems and Tool Chains for AI Engineering	**3**	
SSE 409	Introduction to Machine Learning for Engineers	**3**	
SSE 410	Trustworthy and Ethical AI Engineering	**3**	
SSE 411	Advanced Digital Signal Processing	**3**	
SSE 412	Data Analytics for the Semiconductor Industry	**3**	
SSE 413	Principles and Engineering Applications of AI	**3**	
SSE 414	Optimization in AI Technology	**3**	
SSE 415	Information Theory Measures for Artificial and Natural Intelligence Systems	**3**	
SSE 416	Designing Human-Centered Software	**3**	
SSE 417	Estimation, Detection, and Learning	**3**	
SSE 418	Algorithms for Large-Scale Distributed Machine Learning and Optimization	**3**	
SSE 419	Artificial Intelligence in Electrical and Computer Engineering	**3**	

MASTER OF SCIENCE (MS) PROGRAM- Mechanical & Software Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MAE 449	Applied Master Studies in Mechanical & Software Engineering	**3**	
MAE 451	Medical Robotics System Design	**3**	
MAE 452	Advanced Manufacturing Engineering Theory	**3**	
MAE 453	Micromechanics of Heterogeneous and Granular Materials	**3**	
MAE 454	Operating & Hardware Systems Theory & Design	**3**	
MAE 455	Robot System Programming	**3**	
MAE 456	Advanced Artificial Intelligence in MSE	**3**	
MAE 457	Advanced Software Analysis & Integration	**3**	
MAE 458	Stress Waves, Impacts and Shockwaves	**3**	
MAE 459	Advanced Web Development & Design in MSE	**3**	
MAE 460	Hydrodynamic Stability	**3**	
MAE 461	Advanced Software Testing & Automation in MSE	**3**	
MAE 462	Scanning Electron Microscopy 101: Fundamentals of Nanocharacterization and Nanofabrication	**3**	

MASTER OF SCIENCE (MS) PROGRAM- Chemical & Biomolecular Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
CBE 449	Applied Master Studies in Chemical & Biomolecular Engineering	**3**	
CBE 451	Application of Molecular Evolution to Biotechnology	**3**	
CBE 452	Project in Design: Pharmacokinetics	**3**	
CBE 453	Software Carpentry	**3**	
CBE 454	Advanced Chemical Engineering Modeling and Design	**3**	
CBE 455	Hydrodynamic Stability	**3**	
CBE 456	Advanced Artificial Intelligence in Chemical & Biomolecular Engineering	**3**	
CBE 458	Medical Robotics System Design	**3**	
CBE 459	Product Design in Chemical & Biomolecular Engineering	**3**	
CBE 460	Mathematical Methods of Chemical Engineering	**3**	
CBE 461	Pharmacokinetics and Pharmacodynamics	**3**	
CBE 462	Thermodynamics & Statistical Mechanics	**3**	
CBE 463	Supramolecular Materials and Nanomedicine	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Data Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MDE 407	Applied Master Studies in Data Engineering	**3**	
MDE 408	Analytical Data Visualization Engineering	**3**	
MDE 409	Data Architecture Engineering	**3**	
MDE 410	Statistical Learning in Data Engineering	**3**	
MDE 411	Big Data and Cloud Computing Engineering	**3**	
MDE 412	Advanced Artificial Intelligence & Data Engineering	**3**	
MDE 413	Analytical Data Visualization Engineering	**3**	
MDE 414	Data and Database Management with SQL	**3**	
MDE 415	Data Manipulation Engineering	**3**	
MDE 416	Principles of Python Programming in Data Engineering	**3**	
MDE 417	Database Structures and Cybersecurity Engineering	**3**	
MDE 418	Web Development & Cloud Engineering	**3**	
MDE 419	Data Engineering Practicum	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Bioengineering Innovation & Design

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MID 407	Applied Master Studies in Bioengineering Innovation & Design	**3**	
MID 408	Biomechanics, Neuromechanics and Neuroengineering	**3**	
MID 409	Biomaterials, Tissue and Regenerative Engineering	**3**	
MID 410	Bioimaging and Spectroscopy	**3**	
MID 411	Identification and Validation of Global Health Needs	**3**	
MID 412	Advanced Bioengineering Innovation & Design	**3**	
MID 413	Artificial Intelligence Regulation in Medical Devices	**3**	
MID 414	National Security in Bioengineering	**3**	
MID 415	Principles and Practice of Global Business Architecture, Innovation, and Design in Bioengineering	**3**	
MID 416	Innovation Intelligence: Plan, Build, Protect, and Monetize a Technology / Innovation Portfolio	**3**	
MID 417	Advanced Bioengineering Innovation and Technology	**3**	
MID 418	Global Innovation Strategy: Creating Agile, Innovative, Globally Competitive Organizations	**3**	
MID 419	Strategic Performance Management in Bioengineering	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Data Science

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MDS 449	Applied Master Studies in Data Science	**3**	
MDS 450	Data Science and Analytics	**3**	
MDS 451	Probabilistic Modeling and Statistical Computing	**3**	
MDS 452	Analytical Data Visualization	**3**	
MDS 453	Data Science Architecture	**3**	
MDS 454	Statistical Learning in Data Science	**3**	
MDS 455	Big Data and Cloud Computing	**3**	
MDS 456	Advanced Artificial Intelligence & Data Engineering	**3**	
MDS 457	Analytical Data Visualization	**3**	
MDS 458	Data Science for Business	**3**	
MDS 459	Data and Database Management with SQL	**3**	
MDS 460	Data Science Manipulation	**3**	
MDS 461	Principles of Python Programming in Data Science	**3**	
MDS 462	Database Structures and Cybersecurity Engineering	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Biomedical Engineering

Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.

Course No.	Course	Credit(s)	Grade
MBE 449	Applied Master Studies in Biomedical Engineering	**3**	
MBE 450	Annotate a Genome	**3**	
MBE 451	Precision Care Medicine	**3**	
MBE 452	Principles and Applications of Modern X-Ray Imaging and Computed Tomography	**3**	
MBE 453	Computational Medicine: Cardiology Laboratory	**3**	
MBE 454	Foundations of Computational Biology and Bioinformatics	**3**	
MBE 455	Advanced Design Projects: Genomics and Systems Biology	**3**	
MBE 456	Deep Learning for Medical Imaging	**3**	
MBE 457	Special Topics in Bioengineering Innovation and Design	**3**	
MBE 458	Microphysiological Systems	**3**	
MBE 459	Models of the Neuron	**3**	
MBE 460	Systems Pharmacology and Personalized Medicine	**3**	
MBE 461	Business of Healthcare Innovation & Design	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Civil & Systems Engineering **Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.**			
Course No.	**Course**	**Credit(s)**	**Grade**
CSE 407	Applied Master Studies in Civil & Systems Engineering	**3**	
CSE 408	Architectural Engineering - Form, Function and Technology	**3**	
CSE 409	Bridge Engineering	**3**	
CSE 410	Preservation Engineering: Theory and Practice	**3**	
CSE 411	Advanced Structural Analysis	**3**	
CSE 412	Advanced Structural Systems I and II	**3**	
CSE 413	Advanced Software & Systems Architectural Engineering	**3**	
CSE 414	Structural Fire Engineering	**3**	
CSE 415	Natural Disaster Risk Modeling	**3**	
CSE 416	Civil and Systems Engineering	**3**	
CSE 417	Probabilistic Methods in Civil Engineering and Mechanics	**3**	
CSE 418	Architectural Engineering - Form, Function and Technology	**3**	
CSE 419	Lateral Forces: Analysis and Design of Civil and Systems Structural Engineering	**3**	

MASTER OF SCIENCE (MS) PROGRAM – Computer Science **Second year Students may elect to take any of the courses below or take additional courses from the courses listed below. Interested students should confer with their mentors before making such decision.**			
Course No.	**Course**	**Credit(s)**	**Grade**
BCS 449	Applied Master Studies in Computer Science	**3**	
BCS 450	Data Structures	**3**	
BCS 451	Computer System Fundamentals	**3**	
BCS 452	Mathematical Foundations for Computer Science	**3**	
BCS 453	Computer Science & Engineering Architecture	**3**	
BCS 454	Automata & Computation Theory	**3**	
BCS 455	Computer Graphics and 3D Game Programming	**3**	
BCS 456	Artificial Intelligence in Computer Science	**3**	
BCS 457	Web Security & Cybersecurity Analysis	**3**	
BCS 458	Computer Science Innovation & Entrepreneurship	**3**	
BCS 459	Computer Networks	**3**	
BCS 460	Software & Systems Engineering	**3**	
BCS 461	Operating Systems	**3**	
BCS 462	Machine Learning: Artificial Intelligence System Design & Development	**3**	