Cavalla International University

COURSE PROGRAM STRUCTURE/STUDENT CHECKLIST

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

Students enrolled in Accelerated semesters option can complete their degree in 2 – 3 years by enrolling in 4 academic semesters during the year (Year 1 and year 2 academic requirements can be completed in 1 year – see structure below). Students enrolled in the standard semester's option can complete their degree in 3 – 4 years or more but not more than 6 years. **Note: Most students in the accelerated semesters option complete the doctoral program in 2 ½ years.**

DOCTORAL (PHD/ePHD) PROGRAM – FIRST YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
DOC 800	Introduction to Doctoral Studies	**1**	
DOC 805	Research Methods – Design & Analysis	**3**	
DOC 810	Specialized Topic 1 in Students Area of Study	**9**	
DOC 830	Quantitative Research	**3**	
DOC 865	Specialized Topic IV in Students Area of Study	**9**	
Total		**25**	

DOCTORAL (PHD/ePHD) PROGRAM – SECOND YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
DOC 825	Qualitative Research	**3**	
DOC 865	Specialized Topic II in Students Area of Study	**9**	
DOC 835	Strategic Planning; Team Coordination, Cooperation and Collaboration	**3**	
DOC 870	Specialized Topic III in Students Area of Study	**9**	
Total		**24**	

DOCTORAL (PHD/ePHD) PROGRAM – THIRD YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
DOC 840	Teaching/Training	**1**	

DOCTORAL (PHD/ePHD) PROGRAM – Computer Engineering **Third 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**
DCE 6088	Applied Doctoral Studies in Computer Engineering	**6**	
DCE 6090	Computer Science Theory and Applications	**6**	
DCE 6095	Artificial Intelligence Engineering	**6**	
DCE 7000	Organization of Programming Languages	**6**	
DCE 7005	Algorithms	**6**	
DCE 7010	Operating Systems	**6**	
DCE 7030	Digital Computer Design	**6**	
DCE 7035	Software Engineering Requirements	**6**	
DCE 7040	Systems Engineering Requirements	**6**	
DCE 7045	Computer Science Theory and Applications	**6**	

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.

DOC 885	Advanced Specialized Topics in the Students' area of Study	**4**	
Total		**5**	

DOCTORAL (PHD/ePHD) PROGRAM – FOURTH YEAR			
Course No.	**Course**	**Credit(s)**	**Grade**
DOC 845	Independent Field Study/Practicum	**1**	
DOC 890	Advanced Specialized Topics in the Students' area of Study	**5**	
DOC 000	Concept Paper	**0**	
DOC 895	Dissertation Proposal	**3**	
DOC 900	Dissertation (Final Chapters/Defense)	**12**	
Total		**21**	

DOCTORAL (PHD/ePHD) PROGRAM – Mechanical & Systems Engineering

Third 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**
DME 7056	Applied Doctoral Studies in Criminal Justice Systems	**6**	
DME 7057	Mechanics of Flight Risk & Human Factors	**6**	
DME 7058	Advanced Fluid Mechanics	**6**	
DME 7059	Advanced Finite Element Analysis	**6**	
DME 7060	Fabrication of Biomaterials, Engineered Tissues and Food	**6**	
DME 7061	Modern Tools and Applications in Experimental Solid Mechanics	**6**	
DME 7062	Advanced Manufacturing Engineering Theory	**6**	
DME 7063	Advanced Manufacturing Engineering Laboratory	**6**	
DME 7064	Nonlinear Control and Planning in Robotics	**6**	
DME 7065	Learning-Based Control for Robotics	**6**	
DME 7066	Advanced Manufacturing Engineering	**6**	
DME 7067	Robot System Programming	**6**	
DME 7068	Effective and Economic Design for Biomedical Instrumentation	**6**	
DME 7069	Applied Computational Modeling in Aerodynamics and Heat Transfer	**6**	
DME 7070	Orientation Mapping of Crystalline Materials	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Cybersecurity

Third 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**
DCY 7046	Applied Doctoral Studies in Cybersecurity	**6**	
DCY 7047	Advanced Probability & Statistics	**6**	
DCY 7048	Advanced Data/Database Security	**6**	
DCY 7048	Advanced Security Coding & Encryption	**6**	
DCY 7050	Cyber Threat of National Security Technology	**6**	
DCY 7051	Operating and Network Defense	**6**	
DCY 7052	Cybersecurity Planning & Policy	**6**	
DCY 7053	Security Audit & Assessments	**6**	
DCY 7054	Cyber Threat of Artificial Intelligence	**6**	
DCY 7055	Advanced Digital Forensics	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Electrical & Computer Engineering

Third 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**
DEC 7046	Applied Doctoral Studies in Electrical & Computer Engineering	**6**	
DEC 7047	Introduction to Optical Instruments	**6**	
DEC 7048	Advanced Optical and Optoelectronic Instruments and Devices	**6**	
DEC 7048	Computation for Engineers	**6**	
DEC 7050	Advanced Software Engineering Requirements	**6**	
DEC 7051	Principles of Complex Networked Systems	**6**	
DEC 7052	Bioelectricity from Neurons to Semiconductors	**6**	
DEC 7053	Artificial Intelligence Electrical Engineering	**6**	
DEC 7054	Machine Intelligence on Embedded Systems	**6**	
DEC 7055	Electrical Engineering Theory and Applications	**6**	
DEC 7056	Advanced Digital Systems	**6**	
DEC 7057	Digital Computer Design	**6**	
DEC 7058	Software Engineering Requirements	**6**	
DEC 7059	Systems Engineering Requirements	**6**	
DEC 7060	Computer Science Theory and Applications	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Artificial Intelligence Engineering

Third 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
DAI 7427	Applied Doctoral Studies in Artificial Intelligence Engineering	**6**	
DAI 7428	Technology Ethics and the Legal Landscape	**6**	
DAI 7429	Machine Learning for Data Science	**6**	
DAI 7430	Artificial Intelligence in Organizational Leadership	**6**	
DAI 7431	Natural Language Processing	**6**	
DAI 7432	Internet & Web Systems Engineering	**6**	
DAI 7433	Software and Systems Engineering	**6**	
DAI 7434	Advanced Systems Engineering Analysis and Design	**6**	
DAI 7435	Advanced Human-Robot and AI Interaction	**6**	
DAI 7436	Computer Vision & Computational Engineering	**6**	
DAI 7437	Artificial Intelligence Engineering Practicum	**6**	
DAI 7438	Advanced Design of Artificial Intelligence Products	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – AI Software & Systems Engineering

Third 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 7407	Applied Doctoral Studies in AI Software & Systems Engineering	**6**	
SSE 7408	Systems and Tool Chains for AI Engineering	**6**	
SSE 7409	Introduction to Machine Learning for Engineers	**6**	
SSE 7410	Trustworthy and Ethical AI Engineering	**6**	
SSE 7411	Advanced Digital Signal Processing	**6**	
SSE 7412	Data Analytics for the Semiconductor Industry	**6**	
SSE 7413	Principles and Engineering Applications of AI	**6**	
SSE 7414	Optimization in AI Technology	**6**	
SSE 7415	Information Theory Measures for Artificial and Natural Intelligence Systems	**6**	
SSE 7416	Designing Human-Centered Software	**6**	
SSE 7417	Estimation, Detection, and Learning	**6**	
SSE 7418	Algorithms for Large-Scale Distributed Machine Learning and Optimization	**6**	
SSE 7419	Artificial Intelligence in Electrical and Computer Engineering	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Mechanical & Software Engineering

Third 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
DSE 7449	Applied Doctoral Studies in Mechanical & Software Engineering	**6**	
DSE 7451	Medical Robotics System Design	**6**	
DSE 7452	Advanced Manufacturing Engineering Theory	**6**	
DSE 7453	Micromechanics of Heterogeneous and Granular Materials	**6**	
DSE 7454	Operating & Hardware Systems Theory & Design	**6**	
DSE 7455	Robot System Programming	**6**	
DSE 7456	Advanced Artificial Intelligence in MSE	**6**	
DSE 7457	Advanced Software Analysis & Integration	**6**	
DSE 7458	Stress Waves, Impacts and Shockwaves	**6**	
DSE 7459	Advanced Web Development & Design in MSE	**6**	
DSE 7460	Hydrodynamic Stability	**6**	
DSE 7461	Advanced Software Testing & Automation in MSE	**6**	
DSE 7462	Scanning Electron Microscopy 101: Fundamentals of Nanocharacterization and Nanofabrication	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Chemical & Biomolecular Engineering

Third 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 7449	Applied Doctoral Studies in Chemical & Biomolecular Engineering	**6**	
CBE 7451	Application of Molecular Evolution to Biotechnology	**6**	
CBE 7452	Project in Design: Pharmacokinetics	**6**	
CBE 7453	Software Carpentry	**6**	
CBE 7454	Advanced Chemical Engineering Modeling and Design	**6**	
CBE 7455	Hydrodynamic Stability	**6**	
CBE 7456	Advanced Artificial Intelligence in Chemical & Biomolecular Engineering	**6**	
CBE 7458	Medical Robotics System Design	**6**	
CBE 7459	Product Design in Chemical & Biomolecular Engineering	**6**	
CBE 7460	Mathematical Methods of Chemical Engineering	**6**	
CBE 7461	Pharmacokinetics and Pharmacodynamics	**6**	
CBE 7462	Thermodynamics & Statistical Mechanics	**6**	
CBE 7463	Supramolecular Materials and Nanomedicine	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Data Engineering

Third 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
DDE 7407	Applied Doctoral Studies in Data Engineering	**6**	
DDE 7408	Analytical Data Visualization Engineering	**6**	
DDE 7409	Data Architecture Engineering	**6**	
DDE 7410	Statistical Learning in Data Engineering	**6**	
DDE 7411	Big Data and Cloud Computing Engineering	**6**	
DDE 7412	Advanced Artificial Intelligence & Data Engineering	**6**	
DDE 7413	Analytical Data Visualization Engineering	**6**	
DDE 7414	Data and Database Management with SQL	**6**	
DDE 7415	Data Manipulation Engineering	**6**	
DDE 7416	Principles of Python Programming in Data Engineering	**6**	
DDE 7417	Database Structures and Cybersecurity Engineering	**6**	
DDE 7418	Web Development & Cloud Engineering	**6**	
DDE 7419	Data Engineering Practicum	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Bioengineering Innovation & Design

Third 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
DID 7407	Applied Doctoral Studies in Bioengineering Innovation & Design	**6**	
DID 7408	Biomechanics, Neuromechanics and Neuroengineering	**6**	
DID 7409	Biomaterials, Tissue and Regenerative Engineering	**6**	
DID 7410	Bioimaging and Spectroscopy	**6**	
DID 7411	Identification and Validation of Global Health Needs	**6**	
DID 7412	Advanced Bioengineering Innovation & Design	**6**	
DID 7413	Artificial Intelligence Regulation in Medical Devices	**6**	
DID 7414	National Security in Bioengineering	**6**	
DID 7415	Principles and Practice of Global Business Architecture, Innovation, and Design in Bioengineering	**6**	
DID 7416	Innovation Intelligence: Plan, Build, Protect, and Monetize a Technology / Innovation Portfolio	**6**	
DID 7417	Advanced Bioengineering Innovation and Technology	**6**	
DID 7418	Global Innovation Strategy: Creating Agile, Innovative, Globally Competitive Organizations	**6**	
DID 7419	Strategic Performance Management in Bioengineering	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Data Science

Third 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
DDS 449	Applied Doctoral Studies in Data Science	**6**	
DDS 450	Data Science and Analytics	**6**	
DDS 451	Probabilistic Modeling and Statistical Computing	**6**	
DDS 452	Analytical Data Visualization	**6**	
DDS 453	Data Science Architecture	**6**	
DDS 454	Statistical Learning in Data Science	**6**	
DDS 455	Big Data and Cloud Computing	**6**	
DDS 456	Advanced Artificial Intelligence & Data Engineering	**6**	
DDS 457	Analytical Data Visualization	**6**	
DDS 458	Data Science for Business	**6**	
DDS 459	Data and Database Management with SQL	**6**	
DDS 460	Data Science Manipulation	**6**	
DDS 461	Principles of Python Programming in Data Science	**6**	
DDS 462	Database Structures and Cybersecurity Engineering	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Biomedical Engineering

Third 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
DBE 7449	Applied Doctoral Studies in Biomedical Engineering	**6**	
DBE 7450	Annotate a Genome	**6**	
DBE 7451	Precision Care Medicine	**6**	
DBE 7452	Principles and Applications of Modern X-Ray Imaging and Computed Tomography	**6**	
DBE 7453	Computational Medicine: Cardiology Laboratory	**6**	
DBE 7454	Foundations of Computational Biology and Bioinformatics	**6**	
DBE 7455	Advanced Design Projects: Genomics and Systems Biology	**6**	
DBE 7456	Deep Learning for Medical Imaging	**6**	
DBE 7457	Special Topics in Bioengineering Innovation and Design	**6**	
DBE 7458	Microphysiological Systems	**6**	
DBE 7459	Models of the Neuron	**6**	
DBE 7460	Systems Pharmacology and Personalized Medicine	**6**	
DBE 7461	Business of Healthcare Innovation & Design	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Civil & Systems Engineering

Third 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 7407	Applied Doctoral Studies in Civil & Systems Engineering	**6**	
CSE 7408	Architectural Engineering - Form, Function and Technology	**6**	
CSE 7409	Bridge Engineering	**6**	
CSE 7410	Preservation Engineering: Theory and Practice	**6**	
CSE 7411	Advanced Structural Analysis	**6**	
CSE 7412	Advanced Structural Systems I and II	**6**	
CSE 7413	Advanced Software & Systems Architectural Engineering	**6**	
CSE 7414	Structural Fire Engineering	**6**	
CSE 7415	Natural Disaster Risk Modeling	**6**	
CSE 7416	Civil and Systems Engineering	**6**	
CSE 7417	Probabilistic Methods in Civil Engineering and Mechanics	**6**	
CSE 7418	Architectural Engineering - Form, Function and Technology	**6**	
CSE 7419	Lateral Forces: Analysis and Design of Civil and Systems Structural Engineering	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Computer Science

Third 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
DCS 7449	Applied Doctoral Studies in Computer Science	**6**	
DCS 7450	Data Structures	**6**	
DCS 7451	Computer System Fundamentals	**6**	
DCS 7452	Mathematical Foundations for Computer Science	**6**	
DCS 7453	Computer Science & Engineering Architecture	**6**	
DCS 7454	Automata & Computation Theory	**6**	
DCS 7455	Computer Graphics and 3D Game Programming	**6**	
DCS 7456	Artificial Intelligence in Computer Science	**6**	
DCS 7457	Web Security & Cybersecurity Analysis	**6**	
DCS 7458	Computer Science Innovation & Entrepreneurship	**6**	
DCS 7459	Computer Networks	**6**	
DCS 7460	Software & Systems Engineering	**6**	
DCS 7461	Operating Systems	**6**	
DCS 7462	Machine Learning: Artificial Intelligence System Design & Development	**6**	

DOCTORAL (PHD/ePHD) PROGRAM – Material Science & Engineering

Third 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 7441	Applied Doctoral Studies in Material Science & Engineering	**6**	
MCS 7442	Cybersecurity Systems in MSE	**6**	
MCS 7443	Advanced Physical Chemistry of Materials	**6**	
MCS 7444	Micro and Nano Structured Materials & Devices	**6**	
MCS 7445	Physical Metallurgy	**6**	
MCS 7446	X-ray Scattering, Diffraction, and Imaging	**6**	
MCS 7447	Materials Science Fundamentals for Batteries	**6**	
MCS 7448	Chemistry and Physics of Polymers	**6**	
MCS 7449	Biomaterials for Cell Engineering	**6**	
MCS 7450	Electroanalytical Chemistry & Energy Conversion	**6**	