Graduate Open House

Department of Electrical and Microelectronic Engineering

Master of Science in Electrical Engineering (MSEE)

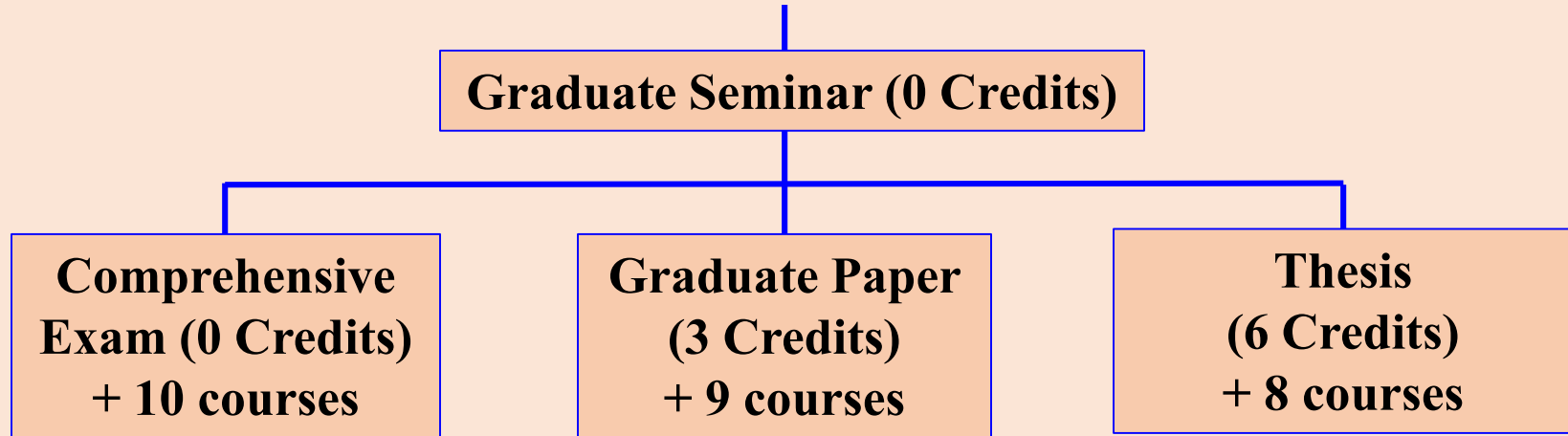**Dr. Jayanti Venkataraman, Professor, MSEE Graduate Program Director**

Dr. Ferat Sahin, Professor, EME Department Head

Patricia Vicari, MSEE Graduate Program Advisor

October 28, 2020

MSEE Graduation Requirements
30 Credit Hours

Graduate Seminar (0 Credits)

Comprehensive Exam (0 Credits) + 10 courses

Graduate Paper (3 Credits) + 9 courses

Thesis (6 Credits) + 8 courses

Focus Areas

1. Communications
2. Control Systems
3. Digital Systems
4. Electromagnetics
5. Integrated Electronics
6. MEMS
7. Signal and Image Processing
8. Robotics

Coursework Distribution

Option	Semester-1	Semester-2	Semester-3	Semester-4
Comprehensive Exam	3 Courses	3 Courses	3 Courses + Comp exam at the end of the semester	1 Course
Graduate Paper	3 Courses	3 Courses	3 Courses + start Graduate paper without registering	Graduate Paper (3 credits)
Thesis	3 Courses	3 Courses	2 Courses + Thesis (3 credits)	Thesis (3 credits)

Course Offerings

	Fall	Spring
Mandated Courses		
Required for all focus areas	EEEE-707 Engineering Analysis EEEE-709 Adv. Engineering Mathematics	EEEE-707 Engineering Analysis EEEE-709 Adv. Engineering Mathematics
Required for all Focus Areas except #5	EEEE-602 Random Signal and Noise	EEEE-602 Random Signal and Noise
Focus Area		
1. Communication	EEEE 692 Communications Networks EEEE-629 Antenna Theory and Design EEEE-718 Des & Charac of Microwave Systems EEEE-793 Error Detect/Error Correction EEEE-797 Wireless Communication	EEEE-693 Digital Data Communication. EEEE-694 Sensor Array Processing for Wireless Comm EEEE-617 Microwave Circuit Design EEEE-710 Advanced EM Theory EEEE-794 Information Theory
2. Control Systems	EEEE-661 Modern Control Theory EEEE-663 Real-Time Embedded Systems	EEEE-664 Performance Engineering of Real-time & Embedded Systems EEEE-765 Optimal Control EEEE-766 Multivariable Modeling
3. Digital Systems	EEEE-620 Design of Digital Systems EEEE-621 Design of Computer Systems EEEE 722 Complex Digital Systems Verification	EEEE-620 Design of Digital Systems EEEE-720 Advanced Topic in Digital Sys Design EEEE-721 Advanced Topics in Computer Sys Design
4. EM, Microwaves and Antenna	EEEE-629 Antenna Theory & Design EEEE-718 Des & Charac of Microwave Systems	EEEE-617 Microwave Circuit Design EEEE-710 Advanced Electromagnetic Theory
5. Integrated Electronics	EEEE-610 Analog Electronics EEEE-679 Analog Filter Design EEEE-711 Advanced Carrier-Injection Devices EEEE-713 Solid State Physics MCEE-601 Micro Fabrication	EEEE-712 Advanced Field Effect Devices EEEE-726 Mixed Signal IC Design MCEE-732 CMOS Mfg.
6. MEMS	EEEE-661 Modern Control Theory EEEE-689 Fundamentals of MEMs MCEE-601 Micro Fabrication MCEE-770 MEMs Fab EEEE-622 Electric Power Trans & Distr (Elective)	EEEE-646 Power Electronics EEEE-787 MEMs Evaluations EEEE-624 Advances in Power Systems (Elective) EEEE-631 Biomed Sensors & Transducers I (Elective)
7. Robotics	EEEE-685 Principles of Robotics EEEE-647 Artificial Intelligence EEEE-661 Modern Control Theory	EEEE-636 Bio-robotics/ Cybernetics EEEE-784 Advanced Robotics
8. Signal & Image Processing	EEEE-678 Digital Signal Processing EEEE-779 Digital Image Processing	EEEE-670 Pattern Recognition EEEE-768 Adaptive Signal Processing EEEE-781 Image and Video Compression EEEE-794 Information Theory

Graduate Thesis and Graduate Paper

- Research Projects conducted under the supervision of a faculty

- Timeline for selecting Faculty Advisor: During 2nd semester

- Selection of a Faculty Advisor: Performed well in related coursework

- Choice of a research topic: - Faculty's Research Interests

<u>Graduate Paper</u>:

       - Research project with a small new contribution

       - Report (Specified format)

       - Approved by Faculty advisor and EME Department Head

       - Graded (A – F)

<u>Graduate Thesis</u>:

       - Research project with a good new contribution

       - Publish as a conference / journal paper

       - Thesis Committee, Student defends the research work

       - Thesis published (Specified format)

       - Approved by Thesis Committee and EME Department Head

CPT Internships

- **Spring 2185: 14 students**

- **Summer 2188: 42 students**

- **Fall 2191: 12 Students**

- **Spring 2195: 13 students**

- **Summer 2198: 13 Students**

- **Fall 2020: 9 Students**

Companies for Internships / Fulltime Employment

ABIOMED	Ford Motor Company	Semiconductor Component Industries
Allegro	Get2Spec	SkuTek Instrumentation
Alstom	Global Foundries	Sony
AMD	Google	Synopsys
Ampere	Intel	Tesla
ANSYS	MetriGraphics	Trumpf
Apple	Micron	TTM Technologies
Aptiv	Microsoft	Vicor
BMW Group	MOOG	Videk
Bosch Securities	ON Semiconductor	VU Search LLC
Bose	PTC	WABCO
Carnegie Robotics	Qualcomm	Xerox
Dialog Semiconductor	Scalable Systems Research Labs	ZF Group

Communications:
Dr. Gill Tsouri
Dr. Panos Markopoulos
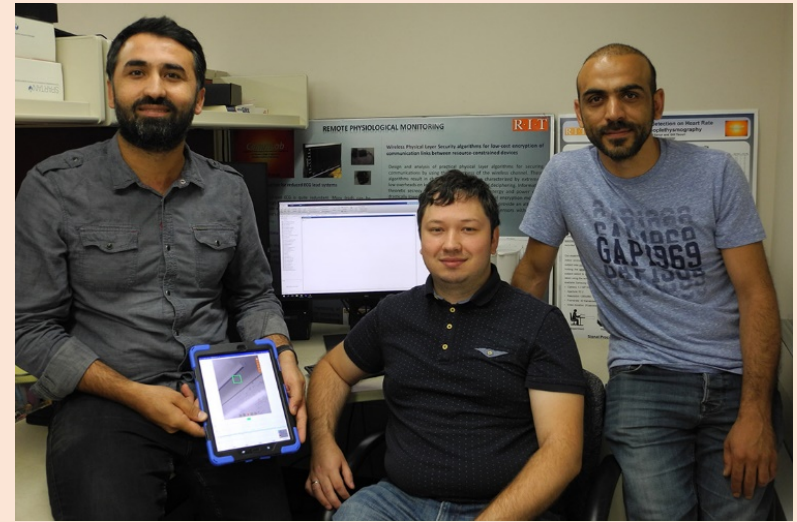
Graduate Paper (May 2020):

1. Experimental Platform for Wireless Sensor Network by Rui Chen (**Tsouri**)

2. A Survey of Security Protocols and Approaches Employed in Internet of Things Applications By Shriya Sadana (**Tsouri**)

3. An Overview of Tensor Methods for Data Fusion by Tiyasa Sarkar (**Markopoulos**)

Controls:
Dr. Sohail Dianat

Graduate Paper (May 2020):

1. State Space Approach to PID Controller Design by Eswar Varma Mavulati **(Dianat**)

2. Forgery Detection in Medical Images by Risha Mishra (**Dianat**)

Digital Systems:
Dr. Dorin Patru and Professor Mark Indovina

MSEE Thesis: May 2020

1. Design of Hardware CNN Accelerators for Audio and Image Classification by Rohini Jayachandre Gillela (**Indovina**)

Graduate Paper: May 2020):

1. Custom Hardware Implementation of a Spiking Neural Network with the Izhikevich Neuron and the Cordic Algorithm by Andrew James Eberhard (**Patru**)

2. Design of DSP Guitar Pedal Effects with FPGA Implementation by Connor Blasie (**Indovina**)

3. The Design of a Custom 32-Bit RISC CPU and PORT TO GCC Compiler Backend by Danielle Megan Fischer (Indovina)

4. Ethernet MAC Core Verification using UVM by Mohammed Pota (**Indovin**a)

5. Small Scale Prototype Smart Car Development Platform by Weinan Qiao (**Indovina**)

6. POSITS: An Alternative to Floating Point Calculations by Matt Wagner (Indovina)

7. Theoretical Analysis and Design of Analog Distortion Circuitry by Daniel Saber (**Indovina**)

Electromagnetics, Microwaves and Antennas: Dr. Jayanti Venkataraman
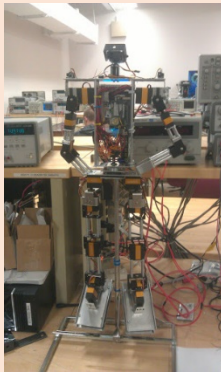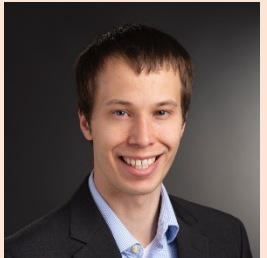

MSEE Thesis: May 2020)

1. Wearable Antennas Backed by Artificial Magnetic Conductor for Enhanced Gain and Reduced Back Radiation by Steven Jacobson (**Venkataraman**)

2. Gain Enhancement of On-Chip Wireless interconnects at 60 GHz Using an Artificial Magnetic Conductor by Douglas Bean (**Venkataraman**)

3. All -Passive Composite Right/Left-Handed (CRLH) Antenna Array for Sum and Difference Patterns By Vu James Le (**Venkataraman**)

Graduate Paper: May2020

1. Wearable Antennas for On- and Off-Body Communication by Jessica Blake (**Venkataraman**)

2. Beam Steering at 60 GHz with Circular Array of Linear Wire Antennas by Samuel Murray (**Venkataraman**)

3. Dual-Band Microstrip Patch Antenna with Dual-Band Cross-Coupled Branch Line Coupler By Vinay Ramesh (**Venkataraman**)

Robotics:
Dr. Ferat Sahin and Dr. Jamison Heard

MSEE Thesis: May2020

1. Turn and Orientation Sensitive A* for Autonomous Vehicles in Intelligent Material Handling Systems by Rashmi Ballamajalu (**Sahin**)

2. Gait Generation for Damaged Hexapods using Genetic Algorithm By Justin Kon (**Sahin**)

Graduate Paper: May 2020

1. Detection of Mental State of a Human using EEG Signals by Sriparvathi Shaji Bhattathir (**Sahin**)

2. Human Tracking for Collaborative Robotics using Intel Real sense Depth Cameras by Justin Beigel (**Sahin**)

3. Mobile Room-Mapping Device By Syed Sajjad Haider (**Sahin**)

4. A RIT Landmarks Detector Based on Deep Learning By Yubo Qu (**Sahin**)

5. Walking Gait Generation for a T-Bot Robot Using Deep Reinforcement Learning By Varun Vivek Vennavalli (**Sahin**)

6. A Fuzzy-logic Based Shared Controller for Adaptive Human-machine Systems Based on Human Workload Assessment by Jaji Bala Jyothika Pamarth (**Heard**)

Integrated Electronics:
Dr. James Moon

Graduate Paper: May 2020

1. The History and Device Characterizations of FinFET Devices By Dania Aceves (**Moon**)

2. Integrated DC-DC Converters by Kevin Bradford (**Moon**)

3. Techniques for Optimizing a FINFET for Analog Applications by Matthew Devi (**Moon**)

4. Origin and Modeling of Noise in MOSFET Transistors by Robert Nova (**Moon**)

MEMs
Dr. Sergey Lyshevski and Dr. Ivan Puchades

Graduate Paper: May 2020

1. Review of Thin Film Technologies for Flexible Electronics by Chinmay Deepak Rozeka (**Puchades**)

Signal and Image Processing
Dr. Eli Saber and Dr. Majid Rabbani

Graduate Paper: May 2020

1. A Survey in Image Deblurring by Donald MacIntyre (**Rabbani**)

2. Semantic Segmentation using Deep Convolutional Neural Networks by Zhen Qin (**Rabbani**)

Internship / Research /Employment: MSEE Student Panel: Current / Alumni

Alums / PhD / MSEE	Student	Focus Area	Advisor
Alumni (MSEE)	Surabhi Rajandekar	Digital Systems	Ampere Advisor: Prof. Indovina
	Meenakshy Iyer	EM, Microwaves and Antennas	TTM Technologies Advisor: Dr. Venkataraman)
PhD (Completed MSEE)	Karthik Subramanian	Robotics	Xerox Advisor: Dr. Sahin
	Mayur Dhanaraj	Communications	Research Assistant Advisor: Dr. Markopoulos
MSEE (Ongoing)	Rutuja Girmal	Signal Processing	Research Assistant Advisor: Dr. Tsouri
	Priyank Kirti Bhatt	Digital Systems	AMD Advisor: Prof. Indovina