MASTER OF SCIENCE IN SENSOR SCIENCE AND TECHNOLOGY

This Master of Science in Sensor Science program is tailored for full-time or part-time students who can complete the Program either on campus or online. Since current and future sensor systems have to be smart, scientific and engineering innovations with interdisciplinary approaches that utilize advanced sensing methods and data analysis to intuitively and intelligently collect, connect, analyze and interpret data from individuals, devices, and systems are expected to enable discovery and optimize health and environment. This program provides its graduates with advanced and specialized training in sensor science and technology, from a multidisciplinary perspective, covering aspects of principles, methods, techniques and technologies that underpin a large range of needs in applications spanning from research to industry, with an emphasis of targeting problems in health and environment. With the skills and knowledge in the specialty area, this program prepares its graduates to be more competitive in pursuing advanced PhD training and in pursuing careers in academia, government, and the many companies developing sensors and sensor-based solutions.

A minimum of 32 credit hours is required for the Master of Science (M.S.) in Sensor Science degree. Two options are available: a thesis option, and a non-thesis option. A maximum of 12 credits of 400-level coursework may be used to fulfill graduate study requirements.

Thesis Option
Students seeking the thesis option must register for 6-8 credit hours of research coursework numbered 591, write a thesis based on original research, and defend it before his or her M.S. thesis committee. The thesis and oral defense should be completed before the end of the third year of academic study. M.S. Chemistry students fulfill their comprehensive examination requirement with their thesis defense.

Code	Title	Credit Hours
Required courses		6
CHEM 545	Sensor Science and Technology	3
CHEM 546	Project in Sensor Science and Technology [1,2]	3
Select a minimum of 12 credits from the following courses.		12
CHEM 503	Survey of Analytical Chemistry	3
CHEM 472	Environmental Chemistry	3
CHEM 456	Computational Biochemistry and Drug Design	3
CHEM 538	Physical Biochemistry	3
FDSN 524	Fundamentals of Food Science	3
FDSN 501	Advanced Nutritional Biochemistry	3
CS 584	Machine Learning	3
BME 525	Introduction to Medical Devices, BioMEMS and Microfluidics	3
ECE 430	Fundamentals of Semiconductor Devices	3
Select one focus with a minimum of 9 credits from the following electives.		9

Focus 1: Sensing Modality (Choose three courses)		
BIOL 504	Biochemistry	3
CHE 514	Process Analytical Technology	3
CHEM 509	Physical Methods of Characterization	3
CHEM 510	Electronics and Interfacing	2
CHEM 548	Electrochemical Methods	3
FDSN 505	Food Microbiology	3
FDSN 507	Food Analysis	3
Focus 2: Sensor Materials (Choose three courses)		
CHE 580	Biomaterials	3
CHEM 455	Advanced Organic Chemistry	3
CHEM 521	Structural Inorganic and Materials Chemistry	3
CHEM 542	Polymer Characterization and Analysis	3
ECE 571	Nanodevices and Technology	3
MMAE 554	Electrical, Magnetic and Optical Properties of Materials	3
Focus 3: Smart sensor devices (choose three course)		
CS 577	Deep Learning	3
ECE 425	Analysis and Design of Integrated Circuits	3
ECE 571	Nanodevices and Technology	3
ITMD 513	Open Source Programming	3
ITMT 593	Embedded Systems	3
Select a minimum of 3 credit hours from the Program Electives [3]		3
INTM 511	Industrial Leadership	3
IPMM 501	Managing the Creative Process	3
SCI 511	Project Management	3
FDSN 420	US Food Safety Regulatory Systems	3
Free Electives		2
Minimum degree credits required		
32		

[1] CHEM 546 can be replaced by BME 594 or CS 594 or ECE 594 or FDSN 594 or ITM 594 when a sensor research project course is offered by faculty from respective departments.
[2] For thesis option, CHEM 546 is replaced by CHEM 591 or BME 591 or CS 591 or ECE 591 or FDSN 591 or ITM 591.
[3] For thesis option, it can be replaced by CHEM 591 or BME 591 or CS 591 or ECE 591 or FDSN 591 or ITM 591.

Non-Thesis Option
Students seeking the non-thesis degree are required to complete a project course to gain hands-on sensor research experience. This project course is offered by faculty and industrial researchers of the Sensor Center (https://cos.iit.edu/icsse/). The non-thesis option is made available for online students, with the project course to be completed at local industrial setting. Students must pass an oral

comprehensive examination by the end of the fourth semester in the program.

Code	Title	Credit Hours
Required courses		6
CHEM 545	Sensor Science and Technology	3
CHEM 546	Project in Sensor Science and Technology [1,2]	3
Select a minimum of 12 credits from the following courses.		12
CHEM 503	Survey of Analytical Chemistry	3
CHEM 472	Environmental Chemistry	3
CHEM 456	Computational Biochemistry and Drug Design	3
CHEM 538	Physical Biochemistry	3
FDSN 524	Fundamentals of Food Science	3
FDSN 501	Advanced Nutritional Biochemistry	3
CS 584	Machine Learning	3
BME 525	Introduction to Medical Devices, BioMEMS and Microfluidics	3
ECE 430	Fundamentals of Semiconductor Devices	3
Select one focus with a minimum of 9 credits from the following electives.		9
Focus 1: Sensing Modality (Choose three courses)		
BIOL 504	Biochemistry	3
CHE 514	Process Analytical Technology	3
CHEM 509	Physical Methods of Characterization	3
CHEM 510	Electronics and Interfacing	2
CHEM 548	Electrochemical Methods	3
FDSN 505	Food Microbiology	3
FDSN 507	Food Analysis	3
Focus 2: Sensor Materials (Choose three courses)		
CHE 580	Biomaterials	3
CHEM 455	Advanced Organic Chemistry	3
CHEM 521	Structural Inorganic and Materials Chemistry	3
CHEM 542	Polymer Characterization and Analysis	3
ECE 571	Nanodevices and Technology	3
MMAE 554	Electrical, Magnetic and Optical Properties of Materials	3
Focus 3: Smart sensor devices (choose three course)		
CS 577	Deep Learning	3
ECE 425	Analysis and Design of Integrated Circuits	3
ECE 571	Nanodevices and Technology	3
ITMD 513	Open Source Programming	3
ITMT 593	Embedded Systems	3
Select a minimum of 3 credit hours from the Program Electives [3]		3
INTM 511	Industrial Leadership	3
IPMM 501	Managing the Creative Process	3
SCI 511	Project Management	3
FDSN 420	US Food Safety Regulatory Systems	3
Free Electives		2

Minimum degree credits required

32

[1] CHEM 546 can be replaced by BME 594 or CS 594 or ECE 594 or FDSN 594 or ITM 594 when a sensor research project course is offered by faculty from respective departments.

[2] For thesis option, CHEM 546 is replaced by CHEM 591 or BME 591 or CS 591 or ECE 591 or FDSN 591 or ITM 591.

[3] For thesis option, it can be replaced by CHEM 591 or BME 591 or CS 591 or ECE 591 or FDSN 591 or ITM 591.