

MTV Nuclear Engineering Summer School 2020 – Working Schedule

Number of weeks: 12

Start Week: **May 18, 2020**

Consortium for Monitoring, Technology, and Verification Nuclear Engineering Summer School



Students interested in strengthening their research capabilities are invited to register for the upcoming MTV Nuclear Engineering Summer School. This 12-week program will cover a range of topics and techniques that benefit student researchers at all academic levels.

Classes will be taught virtually by MTV faculty, national lab collaborators, and senior PhD students.

Course topics include:

- Nuclear Engineering Background
- Gamma Detection
- Neutron Detection
- Organic Scintillation Detectors
- Analyzing Experimental Data
 - (Including special nuclear material!)



Virtual classes start: May 18, 2020

Classes will occur for 1 hour daily. Tentative schedule: <https://bit.ly/MTVNESS2020>

MTV completion certificate will be granted to participating students.

There is no cost to participate! To reserve your seat, register using the Google form linked below.

<https://forms.gle/66W4WWhc9TfHwDjB7>



Prof. Sara Pozzi
Director

MTV.ENGIN.UMICH.EDU



Week #1: May 18-22, Title: Introduction Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
1.1	Introduction to Nuclear Nonproliferation	Professor Sara Pozzi (University of Michigan)	05/18/2020	1:00 PM
1.2	Neutron Interactions and Cross Sections	Michael Hua	05/20/2020	3:00 PM
1.3	Gamma-Ray Interactions	Chris Meert	05/21/2020	3:00 PM
1.4	Introduction to Detectors	Will Steinberger	05/22/2020	3:00 PM

Week #2: May 25-29, Title: Gamma Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
2.1	Introduction to Fission	Dr. Jørgen Randrup (Lawrence Berkeley National Laboratory)	05/26/2020	3:00 PM
2.2	Gamma Ray Detection	Nathan Giha	05/27/2020	3:00 PM
2.3	Activation Analysis	Chris Meert	05/28/2020	3:00 PM
2.4	Enrichment	Will Steinberger	05/29/2020	3:00 PM

Week #3: June 1-5, Title: Neutron Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
3.1	Capture-Based Neutron Detection	Chris Meert	06/01/2020	3:00 PM
3.2	Scatter-Based Neutron Detection	Will Steinberger	06/02/2020	3:00 PM
3.3	History: Manhattan Project	Alan Carr (Los Alamos National Laboratory)	06/03/2020	3:00 PM
3.4	Far-field Reactor Discovery and Monitoring using Antineutrinos	Professor Igor Jovanovic (University of Michigan)	06/04/2020	4:00 PM

Week #4: June 8-12, Title: Data Processing Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
4.1	Introduction to Pulse Processing	Will Steinberger	06/08/2020	3:00 PM
4.2	Correlation Analysis	Stefano Marin	06/09/2020	11:00 AM

4.3	Introduction to Neural Networks	Abbas Johar Jinia	06/11/2020	11:00 AM
4.4	Generating Files with Matlab, Python or C++	Michael Hua / Will Steinberger / Abbas Johar Jinia		
4.5	Nuclear Arms Control and Verification: Past, Present, and Future	Professor Alexander Glaser (Princeton University)	06/12/2020	3:00 PM

Week #5: June 15-19, Title: Monte Carlo Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
5.1	Monte Carlo Intro I	Michael Hua	06/16/2020	11:00 AM
5.2	Monte Carlo Intro II	Shaun Clarke	06/16/2020	3:00 PM
5.3	Fun MC Examples and Intro to Statistics	Prof. Christopher Perfetti (University of New Mexico)	06/17/2020	3:00 PM
5.4	Invited Speaker Talk	Prof. Christopher Perfetti (University of New Mexico)	6/19/2020	3:00 PM

Week #6: June 22-26, Title: Detector Characterization Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
6.1	Setting up Your Detector	Will Steinberger	06/22/2020	3:00 PM
6.2	Energy Resolution, Time Resolution, Linearity	Stefano Marin	06/23/2020	3:00 PM
6.3	Light Output	Will Steinberger	06/24/2020	3:00 PM

Week #7: June 29-July 3, Title: Break**Week #8: July 6-10, Title: Time-Correlated Neutron Analysis Week**

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
8.1	Nondestructive Assay for Nuclear Safeguards	Dr. Alexis Trahan (Los Alamos National Laboratory)	07/06/2020	3:00 PM
8.2	Safeguarding Reactors and Spent Nuclear Fuel	Dr. Alexis Trahan (Los Alamos National Laboratory)	07/07/2020	3:00 PM
8.3	Current Research in Time-Correlated Neutron Techniques	Michael Hua	07/09/2020	3:00 PM
8.4	Research at the National Criticality Experiments Research Center	Mr. Jesson Hutchinson (Los Alamos National Laboratory)	07/10/2020	3:00 PM

Week #9: July 13-17, Title: Active Interrogation Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
9.1	Neutron Active Interrogation	Chris Meert	07/14/2020	3:00 PM
9.2	Photon Active Interrogation	Chris Meert	07/15/2020	3:00 PM
9.3	Medical Applications	Noora Ba Sunbul	07/16/2020	3:00 PM
9.4	Synergizing imaging, dosimetry, and radiotherapy with machine learning	Professor Angela Di Fulvio (University of Illinois at Urbana-Champaign)	07/17/2020	3:00 PM

Week #10: July 20-24, Title: Imaging Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
10.1	Antineutrino Detection	Professor Anna Erickson (Georgia Institute of Technology)	07/20/2020	3:00 PM

10.2	Cross-Sections and Criticality During the Manhattan Project	Mark Chadwick (LANL)	7/22/20	11:00 AM
10.3	Introduction to Scatter-Based Imaging and Fundamentals	Will Steinberger	07/22/2020	3:00 PM
10.4	Coded-Aperture Imaging	Dr. Erik Brubaker (Sandia National Laboratories)	07/23/2020	3:00 PM

Week #11: July 27-31, Title: Fission Week

Lecture Number	Lecture Description	Speaker	Date	Time (ET)
11.1	Spontaneous and Induced Fission	Stefano Marin	07/27/2020	3:00 PM
11.2	Fission Event Generators	Stefano Marin	07/28/2020	3:00 PM
11.3	Active Areas of Research	Stefano Marin	07/29/2020	3:00 PM
11.4	Detection Systems at National Laboratories	Stefano Marin	07/30/2020	3:00 PM
11.5	Invited Speaker Talk	Dr. Ramona Vogt (Lawrence Livermore National Laboratory)	07/31/2020	3:00 PM