

# UN 0805 - Introduction to Operational Health Physics - Overview



NUCLEAR SERVICES

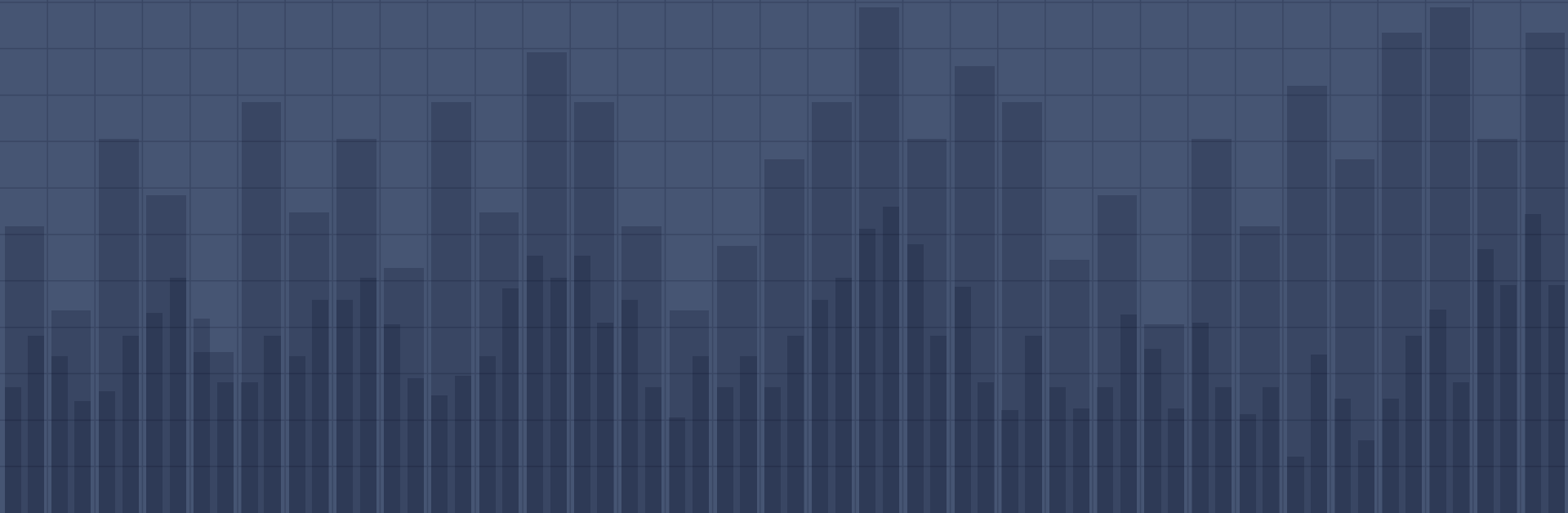
Josip Zic

[SHPNuclearServices@gmail.com](mailto:SHPNuclearServices@gmail.com)

April to June 2021

# Course Logistics

UN 0805 - Operational Health Physics



# Learning Management Platform



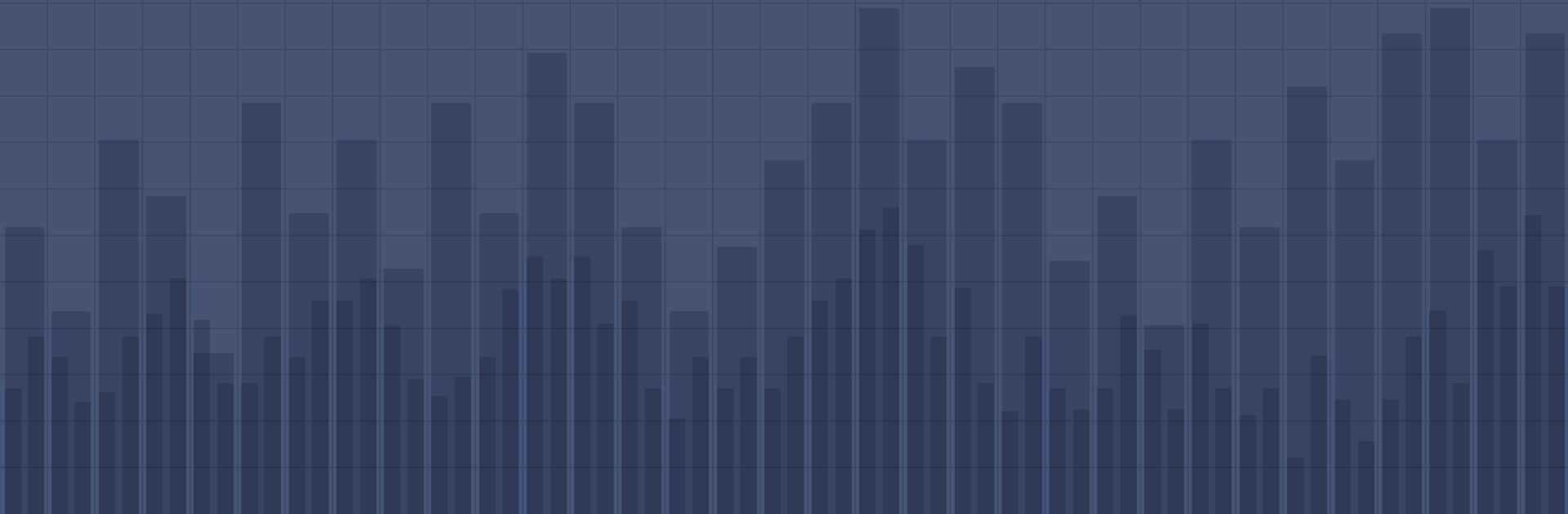
- The Webex platform will be used for class delivery
- Lectures will be recorded and posted on Webex
- Class materials will be posted on the UNENE website in advance of each class.

# Introductions

- Program Director: Dr. Nik Popov
- McMaster MEng: Dr. Jerry Hopwood
- Program Administrator: Areti Tsiliganos

# Course Objectives

UN 0805 - Operational Health Physics



# Learning Objectives




Introduce students to the fundamentals of occupational and environmental health physics encountered in the nuclear power, medical and research fields.

Concepts include principles and regulatory framework for radiation safety; key dosimetric quantities, units and models; doses from internal and external exposures to ionizing radiation; elements of a radiation safety program; and environmental exposure pathways.

# Learning Outcomes


- Explain and apply key dosimetric quantities, units and models.
- Understand the basic framework of Radiation Protection, as defined by the International Commission on Radiation Protection (ICRP)
- Understand Canadian Nuclear Safety Commission (CNSC) Nuclear Safety Act and Regulations, as they pertain to Radiation Protection at a Class I Nuclear Facility.
- Explain and describe the application of the key elements of radiation safety programs for various nuclear facilities and settings.

# Learning Outcomes

- 
- Perform basic assessments and analysis required of Health Physicists in a variety of settings, such as:
    - Dose estimation for radiological exposure scenarios involving exposure to airborne contamination, surface contamination and / or external radiation hazards,
    - Shielding needs assessments, and
    - Hazard assessments of protocols involving radioactive materials.
  - Understand how to plan radiological work, implement ALARA tools to minimize dose and estimate collective dose.
  - Explain how radiological source term changes throughout the life of a nuclear facility and its impact on dosimetry, instrumentation, material release, environmental releases and decommissioning.

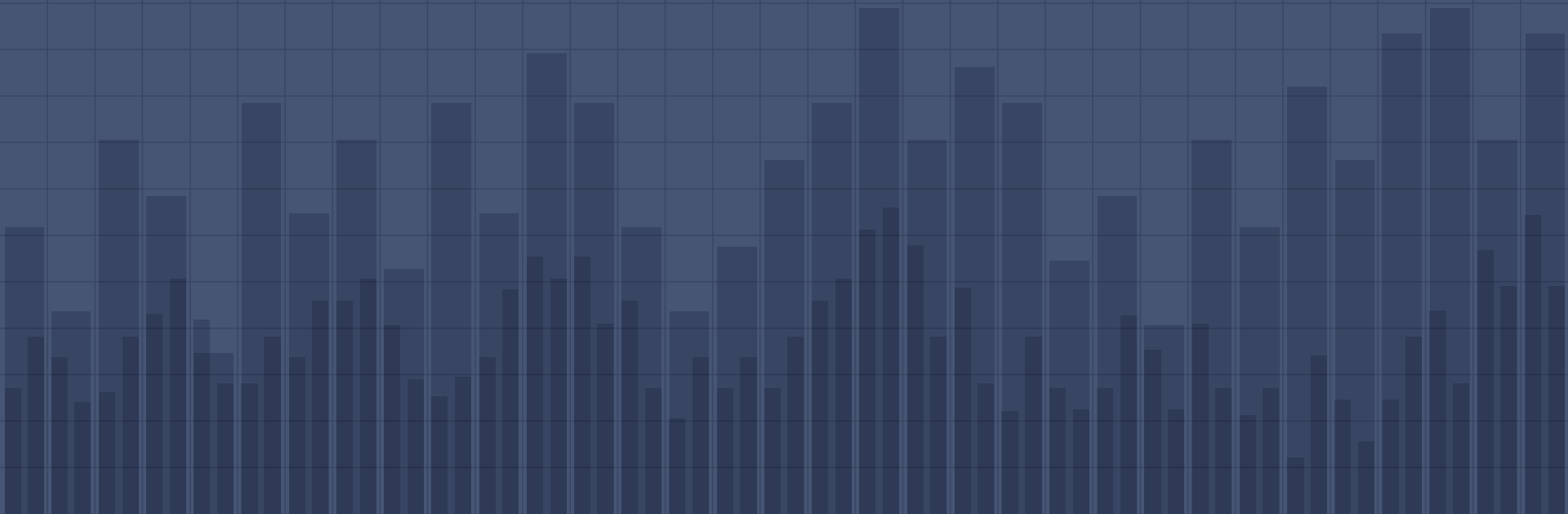


# Learning Outcomes

- 
- Understand the basic principles of clearing material from radiological areas.
  - Determine doses resulting from routine and accidental releases of radioactive material to the environment.
  - Establish derived emission limits for nuclear facilities and assessing potential public doses from accidents.

# Course Outline

Operational Health Physics



# GRADING

Assignment #1 → 20%

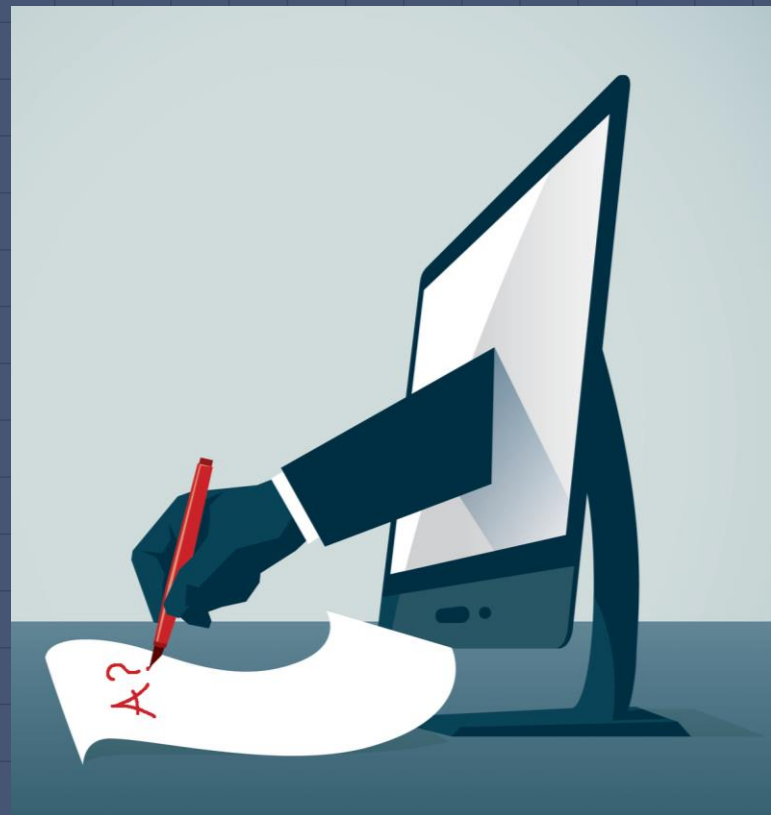
Assignment #2 → 20%

Assignment #3 → 20%

- Due ~1 week after being sent out

Final Exam → 40%

- Due 3 hours after being sent out



# Course Topics and Schedule


| Date  |    | Topics        | Module  |             |
|-------|----|---------------|---|-------------|
| April | 11 | 09:00 - 16:30 | Course Introduction   | RP Programs |
|       |    |               | Review of Harmful Effects of Radiation                      |             |
|       |    |               | ICRP Framework of Radiation Protection                      |             |
|       |    |               | Exposure Scenarios  |             |
|       | 18 | 09:00 - 16:30 | Canadian Radiation Protection Related Acts and Regulations  |             |
|       |    |               | Radiation Safety Considerations at CANDU Nuclear Facilities |             |
|       |    |               | Clearance of Material from Radiological Areas               |             |
|       |    |               | Worked Problems and Solutions                               |             |

Assignment #1 – Due April 25<sup>th</sup>

# Course Topics and Schedule (Cont.)

| Date  |    |               | Topics   | Module                               |
|-------|----|---------------|--|--------------------------------------|
| April | 24 | 09:00 - 16:30 | External and Internal Dosimetry Programs               | Concepts,<br>Quantities<br>and Units |
|       |    |               | Dose from Internal Exposures and Dosimetric Models     |                                      |
|       |    |               | Annual Limits on Intake and Derived Air Concentrations |                                      |
|       |    |               | Worked Problems and Solutions                          |                                      |
|       | 25 | 09:00 - 16:30 | Radioactive Source Term                                | Operational<br>Health<br>Physics     |
|       |    |               | Contamination Control                                  |                                      |
|       |    |               | Shielding  |                                      |
|       |    |               | Worked Problems and Solutions                          |                                      |

Assignment #2 – Due May 8<sup>th</sup>



# Course Topics and Schedule (Cont.)

| Date |    | Topics        | Module   |                            |
|------|----|---------------|--|----------------------------|
| May  | 9  | 09:00 - 16:30 | Planning Radioactive Work                            | Operational Health Physics |
|      |    |               | Implementation of ALARA Tools                        |                            |
|      |    |               | Estimation of Project Collective Doses               |                            |
|      |    |               | Events that Shaped Radiation Protection Programs     |                            |
| May  | 16 | 09:00 - 16:30 | Doses from Accidental Releases at Nuclear Facilities | Emergency Response         |
|      |    |               | Derived Release Limits                               |                            |
|      |    |               | Emergency Preparedness                               |                            |
|      |    |               | Worked Problems and Solutions                        |                            |

Assignment #3 – Due May 29<sup>th</sup>

# Course Topics and Schedule (Cont.)

| Date |                   |               | Topics                                |                                   |
|------|-------------------|---------------|---------------------------------------|-----------------------------------|
| May  | 30                | 09:00 - 16:30 | Effluent and Environmental Monitoring | Public and Environmental Exposure |
|      |                   |               | Radiation Instrumentation             |                                   |
|      |                   |               | Public Exposure Scenarios             |                                   |
|      |                   |               | Worked Problems and Solutions         |                                   |
| June | 6                 | 09:00 - 16:30 | Assignment Review                     | Course Review and Exam            |
|      |                   |               | Sample Exam Problems                  |                                   |
|      |                   |               | Worked Problems and Solutions         |                                   |
|      | Course Evaluation |               |                                       |                                   |
|      | 13                | 13:00 - 16:00 | Final Exam                            |                                   |

# Primary Course Materials

- Class Notes will be provided in advance of each class and will be your primary source of information for completion of assignments and the final exam.
- Additional information will be obtained from:
  - International Commission on Radiation Protection (ICRP):
    - ICRP 103 Recommendations of the Commission on Radiation Protection (2007)
    - ICRP 115 Lung Cancer Risk from Radon and Progeny and Statement on Radon
    - ICRP 119 Compendium of Dose Coefficients based on ICRP Publication 60
  - Canadian Nuclear Safety Commission
    - Nuclear Safety & Control Act
    - General Nuclear Safety and Control Regulations
    - Radiation Protection Regulations
    - Nuclear Substances and Radiation Devices Regulations
- NOTE: ICRP and CNSC documents used in class are available online at no cost.



# THANKS!

**Any questions?**

You can reach me at:

- (647) 261-2500
- [shpnuclearservices@gmail.com](mailto:shpnuclearservices@gmail.com)

