PathologyMU

Measurement Uncertainty Advanced - Module Definition Form

Module definition	
Module code	MUA
MDF Version	1.0
MDF Date	September 2020
Course details	
Module Title	Measurement Uncertainty Advanced
Learning Pathway	Measurement Uncertainty
Module Lead	Stephen MacDonald
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Course Delivery	
Learning type	● Live presentations ● Online presentations ● Virtual tutorials
Student requirements	
Requirements	● Internet connection ● Access to Zoom or Microsoft Teams (Individual cohort requirements specified upon registration) ● Access to spreadsheet software (Excel, Google Sheets)
Pre requisites	Measurement Uncertainty Fundamentals (MUF)
Study commitment	
Expected study time	2-3 hours per week
Course duration	8 weeks
Module synopsis	
This module expands on the fundamental concepts delivered in MUF and allows the delegates to expand their repertoire of techniques to assess those situations where “simple” assessments are not appropriate. In particular a deep dive into approaches that incorporate more heavy lifting statistically are covered. Monte Carlo methods for propagation of	

uncertainty, and how that relates to the GUM framework of uncertainty estimation is a key skill to obtain

The importance of traceability and calibration in our assays and how that is reflected in our uncertainty budget take centre stage.

We then begin the topics that end this module and flow into the beginning of our final module - applications of uncertainty. In this module we will cover how to set MU limits, how to assess them regularly and what approaches we could take for having these limits across multiple systems. Consolidation of pathology services is here to stay so how can we reliably assess all platforms at once? We will see in this module.

Upon completion of this module, attendees will be extremely competent in the aspects of MU estimation they will encounter in their practice. Upon completion delegates will naturally progress to the next level in the MU pathway - Measurement Uncertainty Applications. This is where the real magic happens.

Content outline

This module focuses on Advanced aspects of MU assessment:

- Traceability and propagation to uncertainty
- Calibration, and methodology of measurement and its impact on uncertainty
- Monte Carlo methods for propagation of uncertainty through probability distributions (it's a lot simpler than it sounds)
- Setting and applying limits for MU
- Networking MU in production

Key resources

Online	pathologymu.com pathologyuncertainty.com

Learning Outcomes

All modules provided at pathologymu.com follow the same framework of 6 steps as a pathway to achieve the module learning outcomes. For MU Advanced they are:

Type	**Standard to achieve**
Knowledge and Understanding	Upon successful completion of this module, delegates will have developed a full understanding of the terminology, principles and theories that underpin advanced topics in measurement uncertainty evaluation. Statistical concepts introduced in MUF will be built on to increase their repertoire.

Comprehension	By the end of the module the delegates shall be confident in applying their gained skills and knowledge when “simple” methods are not available or appropriate Delegates will be able to explain, and justify, what approaches have been taken in their local approach stemming from the learning here
Application	From the outset of the module delegates shall learn how best to choose the most suitable method, even if it is a more complex approach.
Analysis	Being able to review processes and apply more complex techniques, and to explain why they are the most appropriate. Why sometimes the simple approach is not only incorrect but potentially dangerous
Synthesis	Application of the skills learnt during the course project will encourage every delegate to have the confidence to work autonomously, including having the skill set to develop new systems in their own repertoire
Evaluation	Upon completion of this first module delegates will have all the skills required to develop and implement a holistic approach to continual evaluation and improvement in performance. This allows an engagement between departments, and sections within departments in a common system.
Learning structure	
Live Presentations	**Hours: 2** **Details:** Project progress updates and reviews of material covered in the online learning.
Online presentations	**Hours:** 20+ hours of online instructional content. **Learning outcomes:** All learning outcomes **Details:** Each topic is presented in a sequential pathway, each topic building on the previous. Topics are opened weekly.
Virtual tutorials	**Hours: 4** **Learning outcomes:** **Details:** These sessions are specifically designed to supplement the

	online learning throughout the course. The facilitator will review all content and extend the topics whilst at the same time approaching any content that needs clarification. Each session represents a checkpoint in the pathway. Successful completion of the online content and tutorial session is dependent on the learning objectives being achieved.
Assessments	
Formative Assessments	**Method:** Online quizzes and short exercises to support learning and develop the skills being taught in the online and tutorial sessions. A scientifically proven methodology for guaranteeing information retention and understanding is used. Constant feedback is provided to ensure understanding at all stages **Learning Outcomes:** All learning outcomes **Weighting:** 0%, but required to be completed to progress to the next topic
Summative Assessments:	**Method:** Submission of small reports demonstrating understanding and application of the taught course content. Each major topic within the module will be assessed separately and aggregated results being applied to the final achievement **Learning Outcomes:** All learning outcomes **Weighting: 20 %, (2 submissions of 10%)**
Course Project	**Method:** Delivery of a group project demonstrating critical evaluation of the course content and appropriate application to a methodology of the cohorts choosing. This will culminate in a submission to a peer reviewed publication. **Learning Outcomes:** All learning outcomes **Weighting:** 80%
Course completion	Attendees will receive a pass/fail for the module. Successful completion of this module automatically allows the attendee to progress to the final level of the pathway - Measurement Uncertainty Applications (MUAP).