Research and Innovation in Forensic Science: Achieving Quality Matters Course Certification

Dr. Amy J. Heston
Professor of Inorganic Chemistry
Walsh University, North Canton, Ohio
aheston@walsh.edu

Feb. 27, 2025

Agenda

- Introduction & My QM Journey
- Multiyear Evolution of Introduction to Forensic Science
- QM Standards Light My Way
- Innovation in Pedagogy
- **Q**uality **M**entions (More examples, course map)
- Evidence of Student Success at the Course Level
- Evidence of Increase in Quality Assurance for Walsh
- Future Directions
- Q&A

WALSH UNIVERSITY
EDUCATION FOR LIFE

Introduction

WALSH UNIVERSITY
EDUCATION FOR LIFE

Hello QM Colleagues!

My roles at Walsh University, QM, & Beyond:

- Professor of Inorganic Chemistry
- Faculty Director of Academic Excellence Pillar of Walsh's teaching and learning center
- Chair of Assessment Committee
- QM Faculty Liaison for eLearning
- QM Ohio Executive Committee, NE Regional Rep.
  - QM Ohio Consortium
- QM Master Reviewer HE & K12
- Reviewer, AALHE* *Emerging Dialogues & Intersection: A Journal at the Intersection of Assessment and Learning*
  - * = Association for the Assessment of Learning in Higher Education

WALSH UNIVERSITY
EDUCATION FOR LIFE

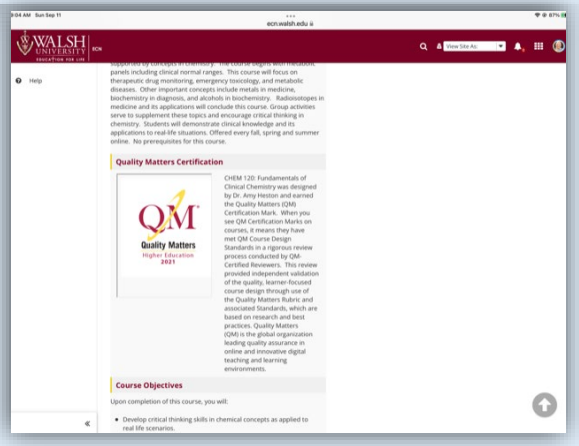
My QM Journey

- Fall 2020:
- **APPQMR** (Applying the QM Rubric)
- My vision: More QM involvement is what our campus needs.
  - ***How can a QM vision become reality?***
    - A personal calling: It needs to start with me.
- **DYBC** (Designing Your Blended Course)
- **TOC** (Teaching Online Certificate): 7-course series
- **PRC HE** & **PRC K12** (Peer Reviewer Certification)

WALSH UNIVERSITY
EDUCATION FOR LIFE

More QM Momentum

- Spring 2021: Completed 2 QM reviews, Earned TOC & MRC HE (Master Reviewer Certification)
- **1st** QM certified course Fundamentals of Clinical Chemistry (CHEM 120)

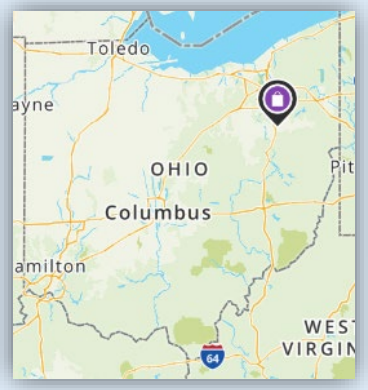


- Serving as MR on QM reviews
- Spring 2023: Acquired 3 more QM certified courses:
  - **2nd**, Intro. to Forensic Science (NS 114)
  - **3rd**, Forensic Chemistry (NS 215)
  - **4th**, Inorganic Chemistry (CHEM 305)

WALSH UNIVERSITY
EDUCATION FOR LIFE

About Walsh University

- 4-year Private, Catholic Institution
- Founded by the Brothers of Christian Instruction in 1960
- Located in North Canton, Ohio (NE Ohio)
- 2,192 students
- Liberal arts curriculum
- 51+ undergraduate majors
- 7 graduate degree programs



mapquest.com

WALSH UNIVERSITY
EDUCATION FOR LIFE

Highlights from the Multiyear Evolution of Introduction to Forensic Science

WALSH UNIVERSITY
EDUCATION FOR LIFE

Multiyear Evolution

- Walsh University's 1st forensic science course
    - NS 114, Introduction to Forensic Science

Focus of Today's Journey:

- From initial design in 2008 to achieving QM certification in 2023
    - Continuous **improvement** in course design
    - Contributes to **student success** (aligns with Walsh mission)

WALSH UNIVERSITY
EDUCATION FOR LIFE

Highlights of Course Design: Early Years

- 2007-2009: Course designed to fulfill science credit in Gen Ed curriculum
    - Spring 2008: 1st offering, F2F (15 students, all majors)
- Success of NS 114 inspired design on NS 215, Forensic Chemistry
- 2014: 1st online offering, asynchronous (14 students, all majors)
- Redesigned assessments: weekly quizzes, online discussions, and a final report (3 parts)

WALSH UNIVERSITY
EDUCATION FOR LIFE

Highlights of Effective Strategies

- Summer 2021: View and evaluate course through eyes of a learner

Highlights of Improvements:

- **Weekly quizzes** to reinforce key concepts. (**case study** quizzes, too)
- **Reflections** to promote self-expression and critical analysis.
- **Improved rubrics** for discussions, reflections, and case study.
- **Increased** learner-learner and learner-instructor **interaction**.
- **Enhanced social presence** through discussion forums and lesson videos.

WALSH UNIVERSITY
EDUCATION FOR LIFE

QM Standards Light My Way in Course Design & Examples

WALSH UNIVERSITY
EDUCATION FOR LIFE

Applying the QM Standards

QM Standards in “Action”!

Highlights from Walsh 1st QM publication:

- Start small & build
- MLOs: One-by-one approach
- **Align** activities, instructional materials, & assessments to MLOs
  - SRS 3.1, 2.4, 4.1, 5.1

TABLE 1 *Lesson 1 MLOs for NS 114.*

Lesson 1 Module-level Outcomes
1. Recognize the main scopes of forensic science
2. Identify the duties and responsibilities of key individuals working at the scene of a crime
3. Recognize the steps involved in a successful crime scene investigation
4. Distinguish between different types of evidence and the proper collection and handling
5. Relate the principles of forensic science to realistic scenarios
6. Describe how the information in this lesson provided you with new insights into forensic science

TABLE 2 *The alignment of Lesson 1 activities, instructional materials, and assessments to module-level objectives (QM SRS 3.1, 2.4, 4.1, 5.1) (4).*

Lesson 1: Learner Activities	Instructional Materials and Assessments	Module-level Objective
Watching	instructor-created video	1-5
Reading	Textbook	1-4
Reading	class notes including images and/or tables	1-5
Watching	content video	2, 3, 5
Explaining	discussion*	1, 4
Identifying	Quiz	1-5
Applying	reflection*	6

**—denotes assessment with written feedback.*

WALSH UNIVERSITY
EDUCATION FOR LIFE

Diving Deeper into Assessment Design

QM Standards in “Action”!

- Breakdown of **assessments & their alignment** to MLOs
- SRS 2.4, 3.1

TABLE 3 *Breakdown of Lesson 1 assessments and their alignment to module-level objectives. (QM SRS 2.4, 3.1) (4).*

Lesson 1: Assessments	Module-level Objective	Assessments per Lesson	Total Point Value per Assessment
Discussions	1, 4	2	20
Quizzes	1-5	2	20
forensic reflection	6	1	6

WALSH UNIVERSITY
EDUCATION FOR LIFE

Highlighting Unique Course Elements

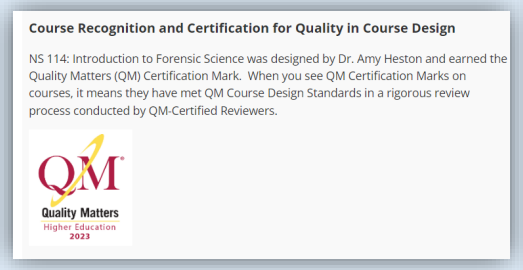
New course elements i**mprove learner achievement** & includes unique course elements

- Alignment with GS & SRS

Example:

- Forensic reflection
- GS 3 & SRS 3.1, 3.4

QM Certification, Spring 2023



Course Recognition and Certification for Quality in Course Design

NS 114: Introduction to Forensic Science was designed by Dr. Amy Heston and earned the Quality Matters (QM) Certification Mark. When you see QM Certification Marks on courses, it means they have met QM Course Design Standards in a rigorous review process conducted by QM-Certified Reviewers.

QM Quality Matters Higher Education 2023

Unique Course Element	Alignment with QM GS	Alignment with QM SRS
Course tour	GS 1: Course Overview and Introduction	SRS 1.1, 1.2
Course map and improved CLOs and MLOs that are clearly stated in the course shell	GS 2: Learning Objectives	SRS 2.1, 2.2, 2.3, 2.4, 2.5
Accessible periodic table	GS 4: Instructional Materials & GS 8: Accessibility and Usability	SRS 4.1, 4.5, 8.3
Forensic reflections	GS 3: Assessment and Measurement	SRS 3.1, 3.4
Instructor-created discussion post followed by 1-2 responses per week addressing the entire class	GS 1: Course Overview and Introduction & GS 6: Course Technology	SRS 1.8, 5.1, 6.1, 6.2
New video content of a crime lab, mobile unit, instrumentation, lab procedures, and professional interviews	GS 4: Instructional Materials & GS 8: Accessibility and Usability	SRS 4.4, 4.5, 8.5, 8.6

WALSH UNIVERSITY
EDUCATION FOR LIFE

Innovation in Pedagogy

WALSH UNIVERSITY
EDUCATION FOR LIFE

Student Reflection Formulator

- Enhances the effectiveness of Problem-based learning (PBL) approach
- Research: Aligns with those highlighted in previous projects (Mello)
- My stepwise model guides educators in the creation of effective reflection questions that directly connect CLOs to MLOs
- Streamlines the task and increases educators' efficiency

TABLE 6 *Essential steps for the Student Reflection Formulator.*

Stepwise Process of the Student Reflection Formulator
Step 1. Designate the center of a page as a blank space. The question will be written last.
Step 2. Identify content areas in the module that make a broad impact in the students' future as well as aiding in the achievement of the given MLOs. Then, write down these content areas on a separate sheet of paper, sort them, and make a final arrangement around the center of the draft sheet.
Step 3. Link the MLO to the concentrated content areas.
Step 4. Connect the MLO to the CLO. This is a crucial step to consider because it follows the requirements of QM SRS 3.1, "The assessments measure the achievement of the stated learning outcomes or competencies" (4).
Step 5. Create the reflection question (RQ). This reflection question is key for initiating student-led correlations of the material to real-life situations.

Mello LV, Treagust DF, Won M, Saat RM. Problem-based learning in online science courses: A systematic review. Int J Sci Educ 2023;45(6), 1005- 26.

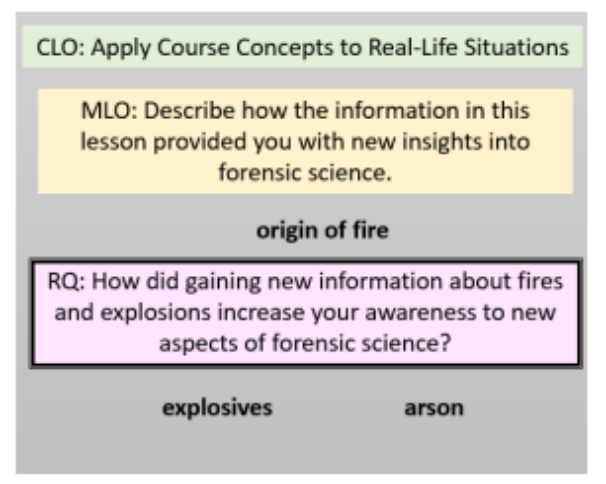
WALSH UNIVERSITY
EDUCATION FOR LIFE

Utilizing Student Reflection Formulator

Example: Apply to Lesson 8: Fires and Explosions

This figure shows how content (origin of fire, explosives, & arson) helped to craft a reflection question (RQ):

"How did gaining new information about fires and explosions increase your awareness to new aspects of forensic science?"



RQ allows students to:

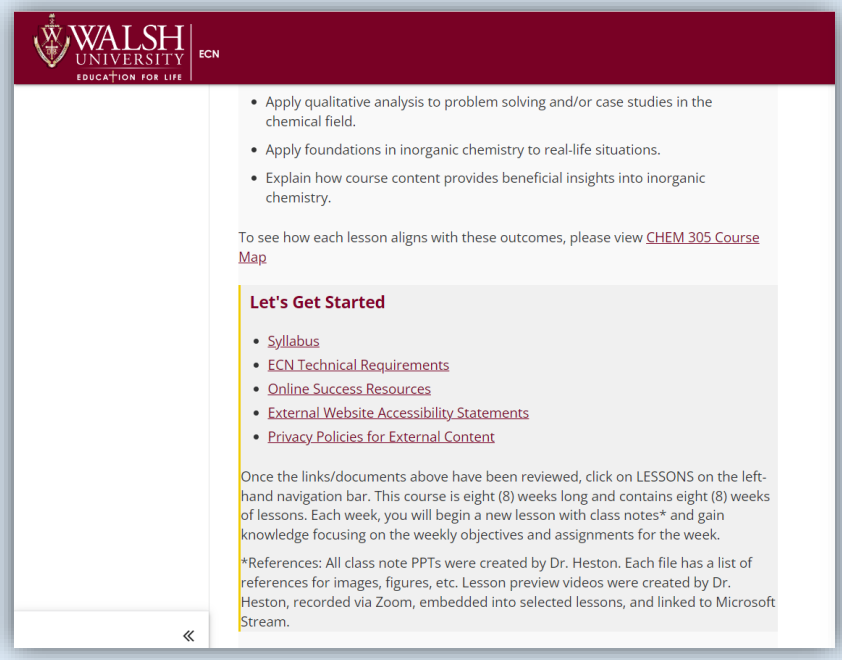
- **analyze** lesson content (student perspective)
- **apply** concepts to real-life situations

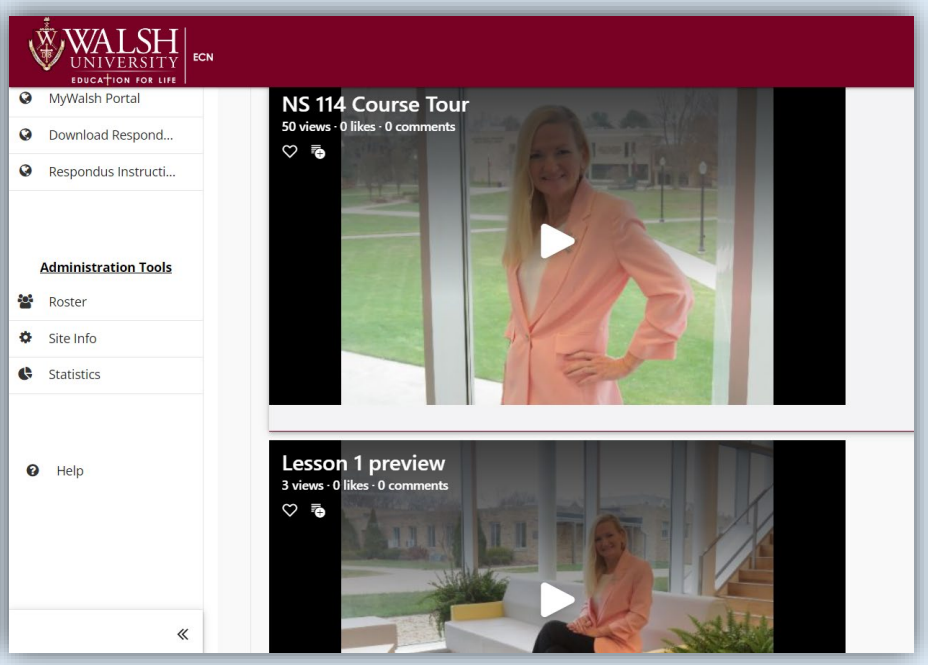
WALSH UNIVERSITY
EDUCATION FOR LIFE

Quality Mentions:
More Examples & Course Map

WALSH UNIVERSITY
EDUCATION FOR LIFE

QM Implementation Supports Quality Assurance General Standard 1 (GS 1): Getting started, course structure, & instructor introduction





Time Saver Tip = Course Tour

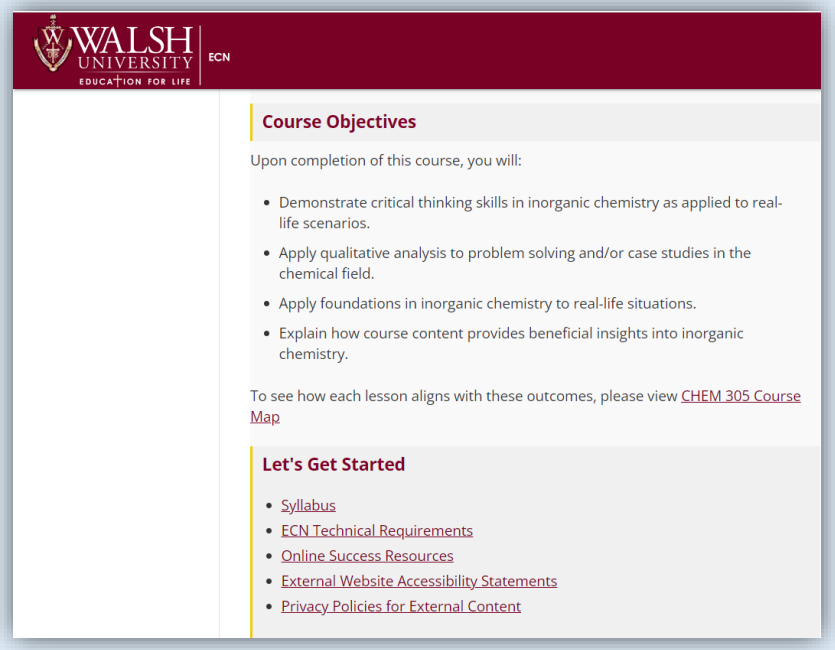
GS 2: CLOs are measurable, clearly stated on syllabus, & found in course

Course Student Learning Outcomes (CSLOS)
Upon completion of this course, students will be able to:

- CSLO 1: Demonstrate critical thinking skills in inorganic chemistry as applied to real-life scenarios.
- CSLO 2: Apply qualitative analysis to problem solving and/or case studies in the chemical field.
- CSLO 3: Apply foundations in inorganic chemistry to real-life situations
- CSLO 4: Explain how course content provides beneficial insights into inorganic chemistry.

Learning Objectives Selected for the Walsh (IDEA) Course Evaluations

- Obj. 1: Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories)
- Obj. 3: Learning to Apply Course Material (to improve thinking, problem solving, and decisions)
- Obj. 8: Developing skill in expressing myself orally or in writing



New Course Element: Tour of a Crime Lab

Time Saver Tip = All Content and Activities in One Place

WALSH UNIVERSITY ECN
EDUCATION FOR LIFE

View Site As:

Readings and Instructional Content

Please complete the following tasks in the order as presented. To clarify, the readings should be done before the video content.

Readings from the Textbook:

- Chapter 1, with special attention to Figure 1.1, introduces you to the foundations of forensic science that will be beneficial throughout this course, including information related to the scopes of forensic science and its history. In addition, the responsibilities of a forensic scientist, crime scene investigation, and sections of a crime scene lab are highlighted in this chapter.
- Chapter 2, with special attention to Figures 2.3, 2.5., 2.6, 2.7, 2.9, and 2.10, provides you with steps of the crime scene investigation process and the collection and proper handling of evidence.

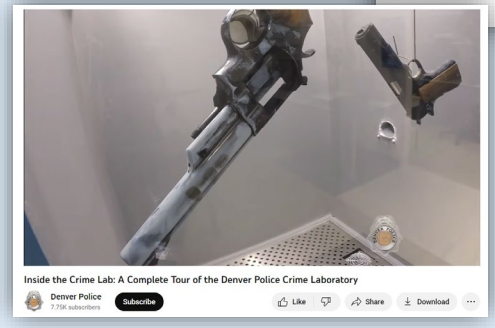
Additional Readings:

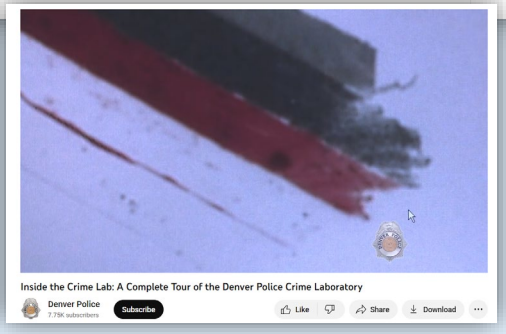
- **Class Notes Ch. 1** [PPT, 532 KB] This set of notes will introduce you to the foundations of forensic science including the main scopes of this field and the design of a forensic science laboratory. Please notice that the scopes of forensic science are given in a list to organize the various details that we will use throughout this course.
- **Class Notes Ch. 2** [PPT, 2.8 MB] This set of notes gives you a look into crime scene investigation and the important protocols related to evidence collection.

Videos:

The focus of the videos below include what you may experience in the field of forensic science as related to the crime lab and its procedures. You will see units of a crime lab and see how their results can impact a forensic investigation.

- **Inside the Crime Lab: A Tour** [27 min]
- **How to Lift Fingerprints** [13 min]





GS 3: Grading policy & rubrics

Grading Methodology and Policies

Final course grade will be based on graded assignments, interactive participation, and demonstration of ethical and professional conduct in all learning activities. Course assignments will be weighted as follows:

Category	Points
Participation	10
Weekly Discussions (best 11 of 12, worth 20 pts. each)	220
Forensic Reflections (best 7 of 8, worth 6 pts. each)	42
Weekly Quizzes (best 13 of 14, worth 20 pts. each)	260
Total:	532

Letter Grade	Percentage
A	93% - 100%
A-	90% - 92%
B+	87% - 89%
B	83% - 86%
B-	80% - 82%
C+	77% - 79%
C	73% - 76%
C-	70% - 72%
D+	67% - 69%
D	63% - 66%
D-	60% - 62%
F	0% - 59%

Discussion Rubric for Written Contributions in Discussion Forum (20 points each)

Criteria
1. Quality of information: Provide accurate information. It is recommended to use resources that support your postings where appropriate. (Textbook, readings, web sites, prior course work, work experience, etc.) Address the questions as much as possible (don't let the discussion stray) as presented for discussion. This does not mean you should not extend the topic, but do not drift from the topic.
Points Provide accurate information. Postings consistently focus on the module's topic and relate the underlying concepts in the readings to the discussion. Address the questions as much as possible. Do not drift from the topic. Points awarded = 5 points Some of the information is inaccurate. Postings consistently focus on the module's topic, but do not relate the underlying concepts in the readings to the discussion. Some of the questions are not addressed properly, or drift from the topic. Points awarded = 2 points Most of the information is inaccurate. Postings simply restate the main concept. Most of the questions are not addressed properly, or drift from the topic. Points awarded = 1 point
2. Original posting: Provide an original posting at the beginning of the discussion period. You can only see the postings of the other students and professor after you submit your original posting.
Points Provide an original posting at the beginning of the discussion period, by the deadline. Points awarded = 5 points Late original posting. Provide an original posting during the discussion period. Points awarded = 2 points No original posting. Points awarded = 0 points
3. Responses: Consistently encourages and facilitates interaction among members of the online community on an ongoing basis over the required minimum number of postings. Provide at least two responses. It is recommended to respond to other students' original postings.

WALSH UNIVERSITY
EDUCATION FOR LIFE

GS 5: Instructor's plan for interacting with learners

- Examples for Online:
- Announcements Tool
- "I will be communicating with you via Walsh email and the Announcements tool in ECN." Weekly deadlines sent directly to student email and posted in LMS homepage.

- Grading & Feedback
- "I will post grades and/or feedback for the discussion within 1 week of the deadline. Feedback for discussions may be given in the comments section of the gradebook."

For other courses, I post feedback/comments for student reflections or activities having short answer questions. I usually post grades within 2 days.

WALSH UNIVERSITY
EDUCATION FOR LIFE

GS 5: More clarity regarding interaction

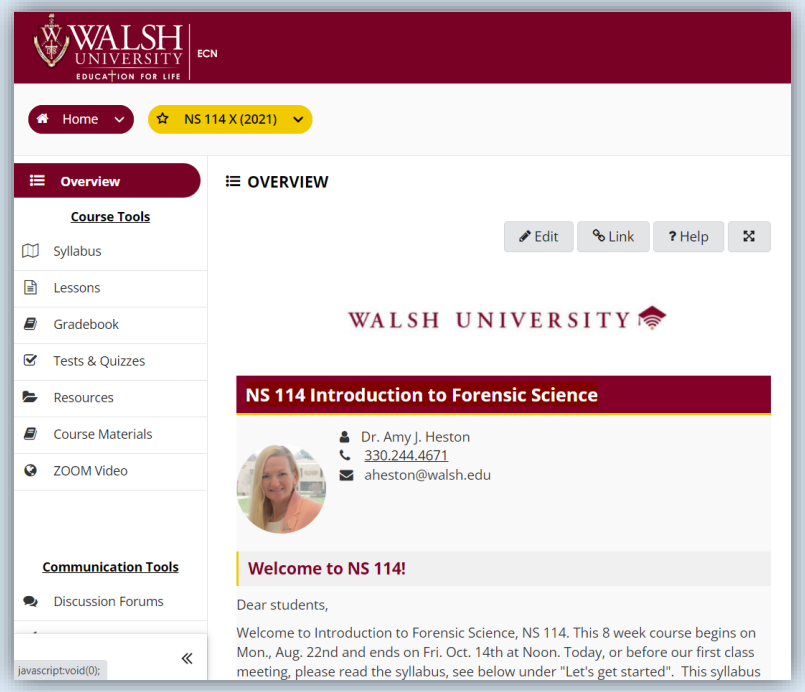
- Discussion Forum
- "The instructor will contribute an original post, monitor the discussions closely, and add at least one additional post that addresses the class as a whole. Additional posts or comments will be submitted as needed. "
- Replies to Emails
- "I will return your email by the end of the workday or the next morning for those sent at night. Any questions sent over the weekend or holidays will be addressed on the next workday of that week."

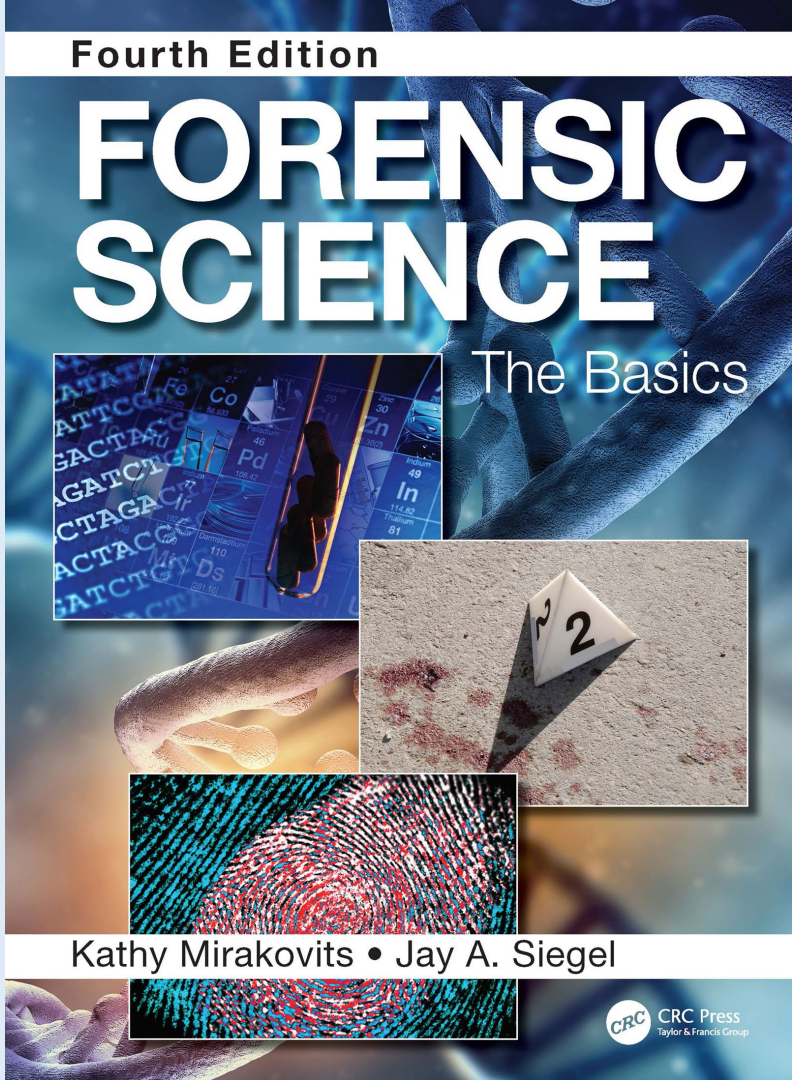
Time Saver Tip = Create your original post & reply to class as a whole

WALSH UNIVERSITY
EDUCATION FOR LIFE

More Examples:
eBook Embedded into LMS

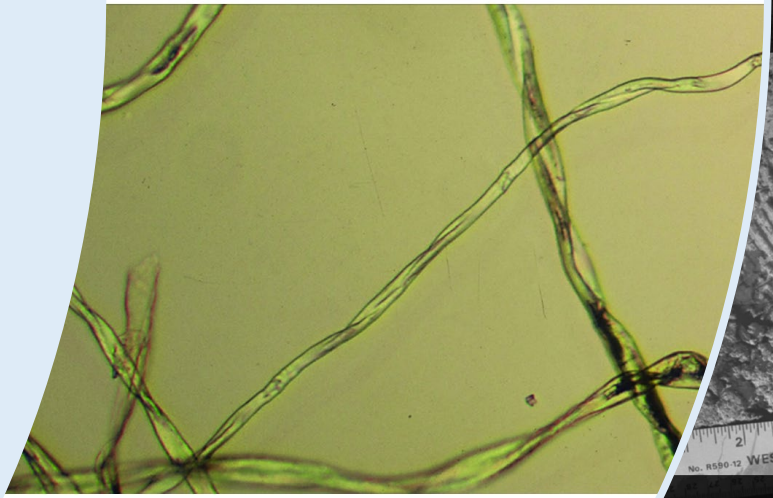
- GS 6: Tools used in the course support the learning outcomes





Forensics eBook

a kitchen. Note the *V* pattern of burning on the wall on the left side. Courtesy of James Novak.



.7 Photomicrograph of cotton fibers. Note the natural twist in the fibers.

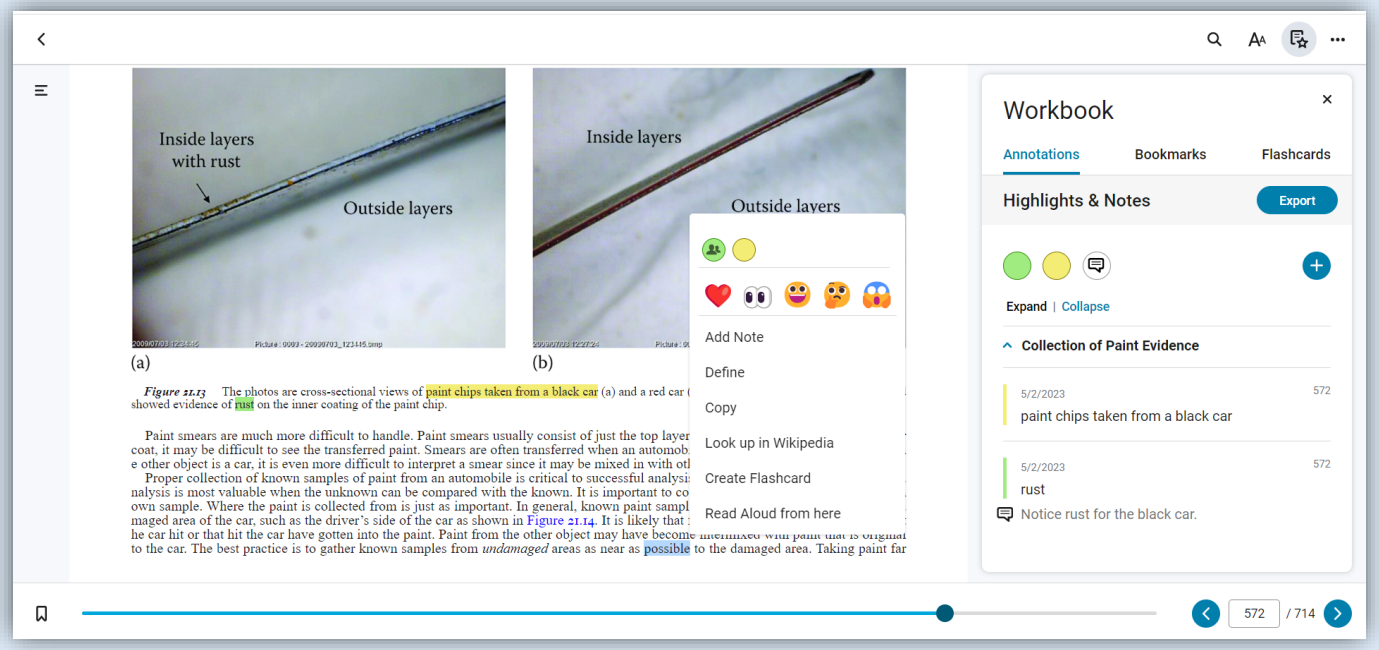
WALSH UNIVERSITY
EDUCATION FOR LIFE

Options in the Forensics eBook

GS 6: Course tools promote learner engagement

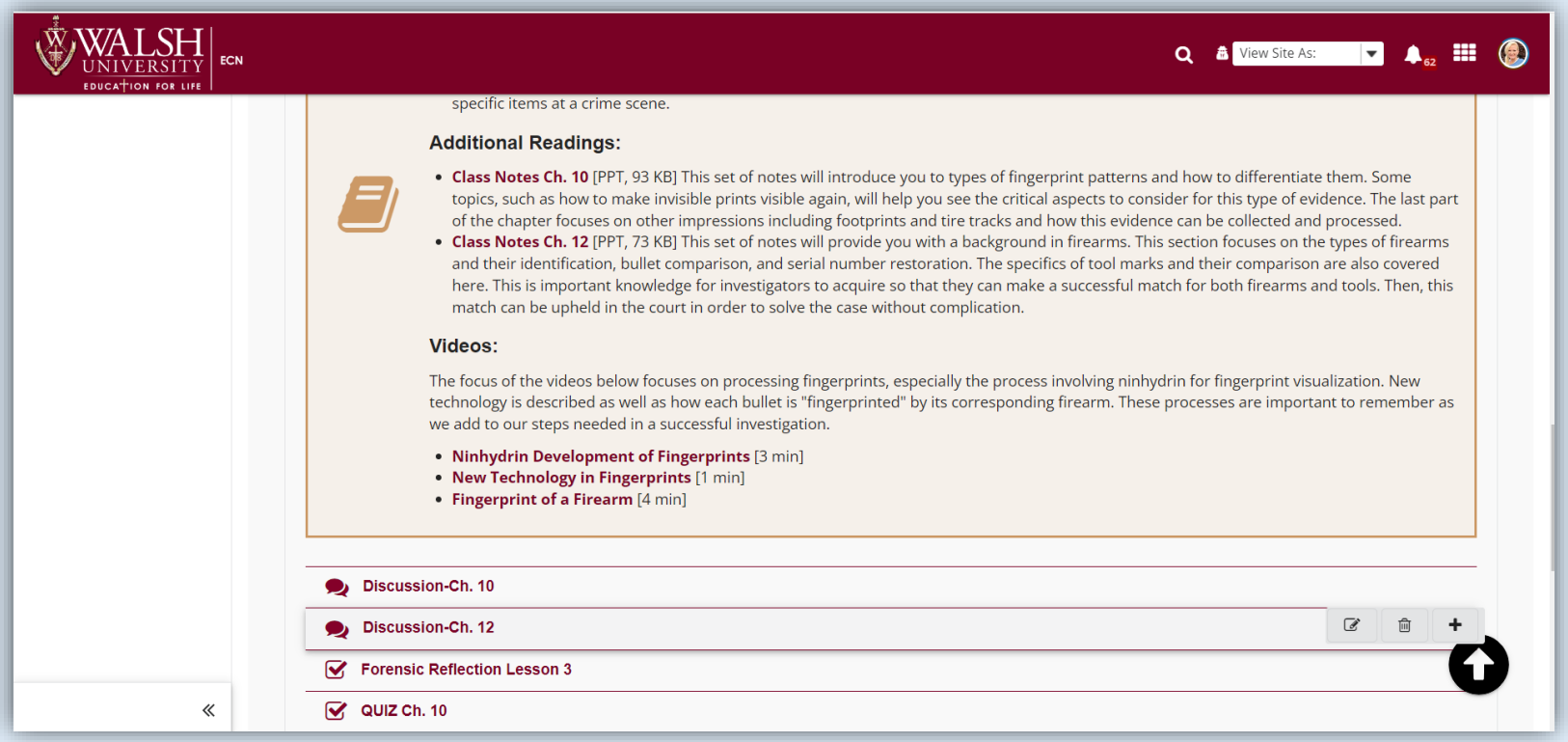
Special Features:

- Annotations
- Highlight
- Bookmarks
- Flashcards



WALSH UNIVERSITY
EDUCATION FOR LIFE

GS 8: Navigation-ease of use



Time Saver Tip = All Content and Activities in One Place

WALSH UNIVERSITY
EDUCATION FOR LIFE

Course Map

Critical for:

- Alignment: GS 2
- Instr. Mat. & Act.: GS 4 & GS 5
- Assessments: GS 3

Course Outcomes/Objectives	Lesson Outcomes/Objectives
Relate foundations of forensic science to the process of crime scene investigation.	1. Recognize the main scopes of forensic science. 3. Recognize the steps involved in a successful crime scene investigation. 4. Distinguish between different types of evidence and the proper collection and handling.
Recognize the duties and responsibilities for different types of crime scene investigators.	2. Identify the duties and responsibilities of key individuals working at the scene of a crime.
Apply course concepts to real-life situations and explain their impact to today's society.	5. Relate the principles of forensic science to realistic scenarios. 6. Describe how the information in this lesson provided you with new insights into forensic science.

Activity	Material(s)	Lesson Objective #	Learner-Content Interaction	Learner-Learner Interaction	Learner-Instructor Interaction
reading	textbook	1-4	x		
watching	instructor-created video	1-5	x		x
watching	content video	2, 3, 5	x		
reading	class notes including images and/or tables	1-5	x		
writing	discussion	1, 4	x	x	x
writing	reflection	6	x		

Assessments	Lesson Objective #
discussions	1, 4
quizzes	1-5
forensic reflection	6

WALSH UNIVERSITY
EDUCATION FOR LIFE

Evidence of Student Success at the Course Level

WALSH UNIVERSITY
EDUCATION FOR LIFE

Evidence of Student Success (NS 114)

- **Increase variety**: added videos to demonstrate forensic applications
- Lessons with **smaller stakes**: discussion (20pts.), quiz (20pts.), reflection (6pts.) each week
- Discussion forum: increased **sense of community** in class
- Feedback within term: students **loved course design** & content!
- Increase in course **grades** each week
- Course evaluations stated **course design was critical to success**
- **Overall grades** increase significantly compared to previous years
- Strategies work for **various disciplines**
- *Personally, QM helped me become a more impactful educator*

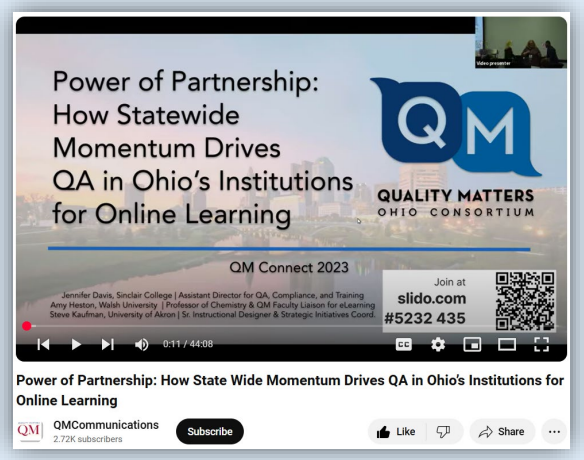
WALSH UNIVERSITY
EDUCATION FOR LIFE

Evidence of Increase in Quality Assurance for Walsh

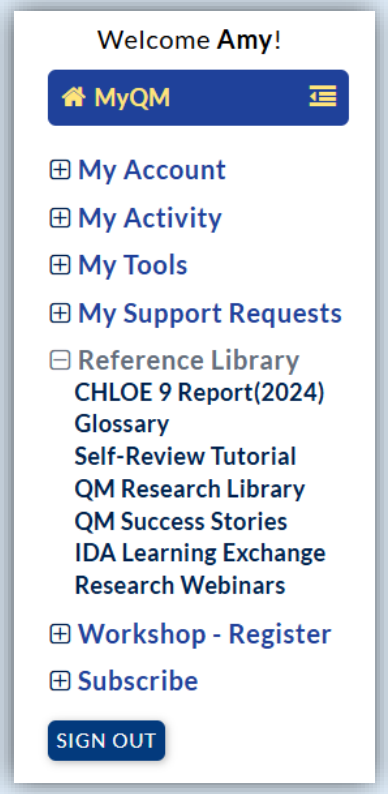
WALSH UNIVERSITY
EDUCATION FOR LIFE

Quality Assurance Evidence & Artifacts

- 2022, QM Success Story, QM Ref. Library (myqm account)
- 2022, 2023*, 2024, QM Connect Presenter (national)
- 2023, my efforts helped bring Walsh from 7 certified courses up to 10 certified courses!



* = 2023 presentation, QM YouTube channel



WALSH UNIVERSITY
EDUCATION FOR LIFE

But Wait, There's More….

- 2024, Walsh's 1st QM Publication: "Advancing Forensics Pedagogy: A Pathway to Quality Matters Course Certification" *J of Forensic Sci Ed* 2024, 6(2).
- 2023-2025, Honors advisor for Walsh's 1st

UG student working with QM implementation

  - student employee completed APPQMR (Sum '24)

- Broader Impact: **Quality Assurance Lasagna**
  - Quality Course Design/ Student Success in CLOs/ Course Assessment/ Program Assessment/ Accreditation/ Institutional Effectiveness/ Institutional Strategic Goals/ University Mission

Created by Gemini

WALSH UNIVERSITY
EDUCATION FOR LIFE

Future Directions

WALSH UNIVERSITY
EDUCATION FOR LIFE

Future Explorations

- Explore new paths in the scholarship of quality assurance
  - What piece could I publish next?
- Continue serving the common good (**Walsh mission**)
- Continue collaborations with greater QM community
  - For Walsh, it's the year of community (institutional core value)
- **Special invitation**: Would you like to collaborate with me?

Never underestimate the power of small changes in course design because they can lead to academic innovation!

WALSH UNIVERSITY
EDUCATION FOR LIFE

Q & A

WALSH UNIVERSITY
EDUCATION FOR LIFE

Q & A

Questions? Please contact me:

Dr. Amy J. Heston
Professor of Inorganic Chemistry
QM Ohio NE Regional Rep &
QM Faculty Liaison for e-Learning
Walsh University
2020 E. Maple St.
North Canton, OH
330-244-4671
aheston@walsh.edu