

OCCUPATIONAL HEALTH AND SAFETY SOLUTIONS  
 University of Utah  
 Department of Mechanical Engineering (MEEN 6140)  
 Department of Family and Preventive Medicine (OEHS 6715)

Lecture: Monday 12:30-2:30 PM and Friday 8-11:00 AM (**facility tours may be up to 3+ hours**)  
 Location: Hybrid- online and 250 E. 200 South SLC Utah Ground level classroom

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD) to make arrangements for accommodations.

The University of Utah values the safety of all campus community members. To report suspicious activity, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

All written information in this course can be made available in alternative format with prior notification.

**COURSE INSTRUCTORS:**

Kenneth d’Entremont, Ph.D., P.E.	Scott Collingwood, Ph.D., MPH, CIH	Melissa Cheng, MD, MOH, MHS
Phone 801-581-6766	Phone 801-294-0001	Phone 801-585-5509
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MEB2105		RMCOEH

**OFFICE HOURS:** By appointment.

**CREDITS:** 3 semester credit hours

**FACULTY:** Kenneth L d’Entremont, Ph.D., PE; Scott Collingwood, Ph.D., MPH, CIH, and Melissa Cheng, MD, MOH and Content Expert Guest lecturers.

**REFERENCES:**

No required text, however individual projects may require utilization of a variety of materials including, but not limited to:

**Accident Prevention Manual for Business and Industry: Engineering and Technology, 12<sup>th</sup> Edition (National Safety Council), PPE Made Easy: A Comprehensive Checklist Approach to Selecting and Using Personal Protective Equipment (Stull). Code of Federal Regulations, Title 29 (OSHA Standards). Personal Protective Equipment (OSHA Publication 3077). Assessing the Need for Personal Protective Equipment: A Guide for Small Business Employers (OSHA Publication 3151). Concepts and Techniques of Machine Safeguarding (OSHA Publication 3067). Job Hazard Analysis (OSHA Publication 3071). Hazard Communication Guidelines for Compliance (OSHA Publication 3111). Respiratory Protection (OSHA Publication 3079). Hearing Conservation (OSHA Publication 3074). Occupational Exposure to Bloodborne Pathogens**

(OSHA Publication 3127. OSHA publications are public domain and are available online in PDF format.

**COURSE DESCRIPTION:**

This course covers the application of relevant safety and health concepts to real-world manufacturing and work environments. Students will help mitigate and minimize occupational hazards present at local manufacturing facilities. The proper selection and implementation of engineering and administrative controls as well as the proper use and maintenance of personal protective equipment (PPE) will be heavily emphasized. Medical management of injuries and illnesses will also be discussed along with recognized preventive medicine strategies. The hierarchy of hazard controls (elimination, substitution, engineering, administrative, and personal protective equipment) and regulatory standards relating to the use of personal protective equipment will be explained. This class stresses the importance of engineering controls and the limitations of individual PPE.

**COURSE OBJECTIVES:**

Upon completion of this course, students will:

- Contribute as a member of a high-functioning multi-disciplinary team that characterizes and presents a solution(s) to an occupational health/safety concern at a local industry. The projects shall draw upon the Industrial Hygiene paradigm of Anticipation, Recognition, Evaluation and Control in characterizing and offering recommendations to real world concerns in industry.
- Understand the hierarchy of hazard control and the importance of sound engineering controls.
- Become familiar with occupational safety and health regulations, particularly OSHA standards.
- Be able to assess the level of occupational safety and health compliance at various facilities with an emphasis on physical hazard control.
- Be able to assess the "safety culture" present at various facilities and discuss the impact that this culture has on safety and health performance.
- Learn how to properly select, use, and maintain various forms of PPE and be able to assess whether particular applications of PPE meet applicable standards.
- Be able to assist a company in improving the safety and health of its employees.
- Learn the benefits, challenges, and limitations of medical screening evaluations of workers.

## EVALUATION OF STUDENT PERFORMANCE:

Assignments	Points
<b>Professionalism:</b>	
Attendance/Participation (75)	
Driver Safety* (25)	100
Division of Labor:	
Team Evaluations 1 & 2 (50 Mid + 50 Final)	100
<b>Book/Documentary Review</b>	100
<b>Summary of Presentations by Guest Presenters</b> (6*20)	120
<b>Mini-Project</b> (50 paper + 50 PPT)	100
<b>OSH Term Project/Team:</b>	
Scope of Work document & PPT presentation (25 + 25)	50
Background & Significance document	30
Methods	30
Results/Discussion	30
Recommendation/Conclusion	30
Final Project Report	200
Final Project Presentation PPT	50
<b>NORA Abstract Submission/Team</b>	50
<b>NORA Poster/Team</b>	50
<b>Total</b>	<b>1040</b>

\*Driver Safety Training must be completed before attendance at the first field session

### Student Grades

Student grades will be based on your performance on projects, PowerPoint presentations, and other required course materials. Student projects, presentations, PowerPoints, papers, and other required course materials **submitted past the due date will not receive full credit** unless the faculty approves the tardiness. The resulting assigned grade may be at a minimum of one letter grade lower and depends on the tardiness of the submittal and the quality of the submitted materials, as determined by the faculty. Grades listed on Canvas may not be the final grade assigned for the class.

Grades will be assigned using the following scale:

94% - 100%	A
90% - <94%	A-
87% - <90%	B+
84% - <87%	B
80% - <84%	B-
77% - <80%	C+
74% - <77%	C
70% - <74%	C-
67% - <70%	D+
64% - <67%	D
61% - <64%	D-
0% - <61%	F

The final project report and Power Point (PPT) presentation will be the outcome of a real-world problem-solving exercise(s). Students will perform workplace assessments and propose, if applicable, better engineering controls or more appropriate work methods and/or PPE. All projects will be supervised by course faculty to ensure both the safety of students and employees at participating facilities.

All assignments and reports must be presented in a professional format, white copy and/or electronic (see the “**Presentation & Written Report**” section below). Facility tour investigation reports are to be completed on an individual basis. Projects will be completed in small teams. Project reports require a written report and a final power point presentation to the class (faculty from several departments will be invited for these presentations).

### **Schedule**

The course will typically meet for lecture and discussion on Mondays and Facility (company) Site Visits on Fridays, however, due to COVID-19 most of the classes will be by Zoom, etc. As many guest lecturers and sites required special accommodations, the schedule is dynamic and will be kept up-to-date on Canvas. **It is your responsibility to stay current with the schedule and be aware of any last-minute changes that may occur.** It is also recommended that you set your Canvas alerts to push important announcements and information directly to your email or phone to stay current with course dynamics during the semester. **It is extremely important that students arrive ahead of time for facility site visits.**

### **Book or Documentary Review:** (PPT presentation to class and submittal of paper)

Each student will select either a book or Documentary (a list is provided on Canvas) to read or view and Present a PPT to the class and submit a review paper, which should be a maximum of two pages and have 1.5 page spacing and with a font of 11 or 12.

### **Summary of Presentation by Guest Presenters:** (Paper submittal)

Several professionals in their field of work have been scheduled to present via teleconferencing to the class. One week after their presentation each student will submit a One-page summary of the presentation (1.5 page spacing and with a font of 11 or 12).

**Individual OSH Investigation Report/Presentation (Mini-Project), see Canvas for examples:** Early in the semester, a topic/mini project will be selected by the student. You are expected to research/investigate the topic in order to develop a presentation and summary document based on this effort. The goal is to give a presentation and summary document sharing the relevant message and/or OSH significance of the investigation. The power point presentation is limited to 5-7 minutes and a 3-minute Q&A. A summary Microsoft Word document should not be a maximum of 2 pages that is 1.5 spaced. An electronic copy of presentation materials (e.g. Power Point slides) should be ready prior to your presentation and should highlight the salient points of the assigned topic. The summary document and the Power Point (PPT) are due electronically one week after your presentation.

### **OSH TERM GROUP PROJECT**

Company projects entail a real-world problem-solving experience. Project groups will be comprised of a multi-disciplinary team of students with diverse backgrounds and skills. The goal of each group shall be to function as a high-performance team in recognizing, evaluating and offering solutions (controls) to work exposures that may be a risk factor for adverse health effects. Instructors shall identify projects with industry partners at sites. **Each project team will select a team leader** who will communicate with the Faculty Member assigned to their project. Communication between the team leader and the assigned Faculty Member is essential in order to provide review comments and corrections to the submitted sections of the paper and the final paper. Facilities and companies that have potential projects will be visited early in the semester in order for the students to select projects and begin writing the project paper. Project groups are assigned by the faculty. Instructors have ultimate approval/assignment of project group members to promote appropriate allocation of personnel and skills. **It is the responsibility of the group (Team) to coordinate any subsequent return visits (for data collection etc.) to the industry partner.** Project groups shall fulfill the service agreement specified in the Scope of Work with the industry partner and are expected to meet project requirements of the course (see below).

The following key phases of the project **REQUIRE FACULTY APPROVAL prior to proceeding:**

- **Scope of Work with appropriate methods (sampling, instrument, procedures)**
- **Final Presentation and Written Report(s)**

**PROJECT REQUIREMENTS (see Canvas for examples):**

**Scope of Work / Proposal** (2-3 pages document, and PPT presentation to class)

Define the concern and the planned scope of work. This document outlines the agreement with the company representative and identifies the deliverable items and methods that are to be included in the final report/presentation. The Scope of work and all sections of the report and final report should be **double spaced**. The Scope of Work is not part of the final document.

**Background & Significance** (PPT presentation to class and submittal of paper)

A review of scientific, professional, and regulatory literature to define a potential hazard, potential adverse health outcomes (include applicable medical/toxicological issues) and potential controls (engineering, administrative & PPE). A discussion of applicable regulatory and voluntary exposure limits should be documented as well as applicable National Occupational Research Agenda (NORA) items. Discussion of possible citations, fines and other issues associated with noncompliance is expected. Methods of hazard evaluation and/or assessment should be discussed.

**Methods** (PPT presentation to class and submittal of paper)

The methods to be used should be documented. Appropriate sampling techniques and analytical tools and procedures for data collection and analysis should be presented. References to applicable standards (OSHA, ACGIH, ANSI, ISO, etc.) should be documented.

**Results** (PPT presentation to class and submittal of paper)

In detailing solutions, expected resources (money, manpower, training, installation time, implementation time etc.) should be identified and enumerated. As part of the solutions presented, it is expected that equipment may need to be identified (vendors, model, price, availability). At this juncture, any on-site data should be collected and analyzed, results synthesized and solutions well thought out and investigated. It may not be possible to obtain comprehensive vendor information (accurate quotes/expenses) or fully explore economic and administrative impacts by the draft due date (although all efforts to do such should be expended). The failure to fully define these parameters at this stage will not impact the grading of this milestone. These issues, however, must be addressed completely in the final report.

**Recommendations/Conclusion** (PPT presentation to class and submittal of document)

A concise summary of the proposed solution and recommendations should be documented. An effective approach to present solutions to companies is to provide a hierarchy or tiered solution. These solutions can increase in cost and complexity and time to implement. You should be careful not to write your solutions as a “smoking gun” that could be adversely used against a company, but should suggest improvements and conclusions within the scope of the data and analysis that is done. This section comprises the most important part of your report, and should be very carefully developed and written to provide meaningful direction to the industry partner.

**References**

Appropriately reference your sources whenever you present information or facts, which are not general knowledge or are not your own creation. The reference list at the end must follow an appropriate peer-reviewed format. Internet references should facilitate retrieval by an interested reader, and include retrieval date. A limited number of internet sources should be used and cited appropriately.

**Appendix**

The appendix should include secondary information such as raw data. In general, don't include figures and tables in appendices. (They generally belong in the text.) A listing of the appendices should be included in the Table of Contents at the beginning of the paper and appendix section. All appendices should be discussed and referenced in the text. DO NOT simply attach all "leftover" material as appendices. All appendix pages should be numbered but may be numbered separately from, the text. For example, if you have Appendices A and B, you may have page numbers A1, A2, B1, B2, B3, etc.

### **Final Written Report and Power Point Presentation to the Class**

The written report should be organized in such a manner as to address the items outlined in the original 'scope of work'. In large part, this document should be a cogent assemblage of the most relevant content of the prior written works associated with the project as well as a well-crafted **Executive Summary**. The body of the report should be able to serve as a stand-alone document. The Executive Summary should appear at the beginning of the document and should be a stand-alone piece that conveys the primary message and action items of the investigation and subsequent report and should be written in a style that can be understood by a non-technical manager.

**The body of the written report should be a maximum of 5-8 pages.** An appropriate citation for all applicable references should be included. An outline of the written report could have the following elements, and **should follow the RMCOEH writing guidelines** (see Canvas for example):

Title Page (1 page)

Limitations and Exclusions of Warranty and Liability, see below.

Executive Summary (1 page maximum)

Table of Contents (1 page)

Body Document (maximum 5-8 pages)

- Background (introduction) & Significance
- Methods
- Results
- Recommendations
- Conclusions, Discussion,
- Reference List

Appendices (as appropriate not included in the 5-8 page of the body document)

- Other relevant documentation (maps, graphs, raw data, worksheets, etc.)

### **LIMITATIONS AND EXCLUSIONS OF WARRANTY AND LIABILITY**

*Project findings described herein were performed using practices consistent with standards acceptable within academics and industry at this time and at a level of diligence typically exercised by graduate students performing similar services. In performing this investigation and accompanying recommendations, the student team tried to establish a balance between the competing goals of limiting investigative and reporting costs and time, while reducing the uncertainty about unknown conditions. Because the findings of this report were derived from a scope of work limited to the conditions outlined by facility health and safety management, the conclusions should not be construed as a guarantee that all occupational and environmental conditions and hazards have been identified and fully evaluated.*

*The graduate student project team or faculty will assume no responsibility for omissions or errors resulting from inaccurate information or data provided by sources outside of their control, including omissions or errors in public records or information from the property owner. The report generated from this evaluation or investigation also does not purport to represent future or past conditions at the subject property. The student team performed the inspections and investigations of this property on the dates given in this report, and cannot be held liable for changes that occurred after the*

*inspections were performed. No warranty or guarantee, expressed or implied, can be made regarding the findings, conclusions, or recommendations contained in this final report.*

### **Final Report and Power Point Presentation to Company & Instructors and Class**

The written document should incorporate changes (if any) based on feedback from any prior reviews. This may require additional formatting and presentation changes to reflect a report that takes the form of a consultant's report, instead of a research/project report. A complete electronic version shall be submitted (editable-i.e., MSWord) to all 3 course instructors. Similarly, a single hard-copy (if desired by site contact) shall be provided to the primary point of contact at the industry partner as well as an electronic version (non-editable-e.g., PDF).

A PowerPoint presentation for the final team project will be presented (10-15 minutes) before the Occupational Solutions class and to the company representatives.

**A course instructor must approve any final report or presentation prior to submittal to any company representative.**

### **PRESENTATIONS**

A 15-minute presentation focused on the primary message (scope and significance of concern) methods of analysis (evaluation) and action items (solutions / controls) shall be given in class. At the conclusion of the presentation, 5 minutes shall be allotted for Q&A and comments from the student/faculty audience. Relevant feedback from this presentation should be used to improve and/or modify the presentation/delivery if given again to the Industry Partner and/or NORA (see below). The presentation should address the items outlined in the original 'scope of work'. **Guidelines for presentation are provided on Canvas and should be strictly followed.**

#### **Industry Partner Presentation**

An oral presentation to the industry partner (if requested) should reflect changes (if any) based on feedback from the prior class presentation. This presentation should be coordinated with the company, and at least one course instructor should accompany the team for the presentation.

#### **NORA Presentation**

The University of Utah National Occupational Research Agenda Symposium is a forum for young investigators to present current research/investigations. The NORA Symposium is scheduled for April 16, 2021 as a Virtual Symposium <https://nora.mech.utah.edu/>. A gradable requirement of this course is to submit your project abstract to this symposium. If your group's abstract is accepted, you are expected present at Utah NORA and your group will be recognized as invited presenters (the NORA presentation and Poster presentation can be included on your resume / CV). Your NORA abstract is due to the instructors 7 days prior to the Submission Deadline for approval. Once approved you must submit your abstract to NORA. A second requirement is that all project teams will be required to prepare a poster for the NORA Conference, see examples in Canvas.

#### **Division of Labor/Teammate Evaluations**

Twice during the semester each project group member shall be asked to assess individual and team members' contribution to the team's progress, with respect to the team's goals. Instructors shall review these evaluations and make recommendations, if warranted, anonymously to teammates based on these evaluations (i.e., if 3 teammates indicate and document that the 4th teammate has done very little to date, the 4th teammate will be notified

their effort is severely lacking and their grade may be adjusted accordingly. There is an opportunity for this 4th teammate to 'make up' work on future requirements of the project). In addition, a self-evaluation of your own strengths and weakness' as well as those of your teammates may be taken. If obtained, this information may be shared (anonymously) to gain insight as to others perception of your interpersonal skills when contributing to a high-performing team.

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**University of Utah Syllabus and Course Policies:**

[https://ctle.utah.edu/inclusiveteaching/resources/inclusive\\_syllabus/Syllabus%20Checklist updated 080519%20.pdf](https://ctle.utah.edu/inclusiveteaching/resources/inclusive_syllabus/Syllabus%20Checklist_updated_080519%20.pdf)

**ADA Statement**

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**Campus Safety**

The University of Utah values the safety of all campus community members. To report suspicious activity, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).”

**Sexual Misconduct**

Addressing Sexual Misconduct. Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677 (COPS).

**Wellness Statement**

Wellness Statement. Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural difference, etc. can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at [www.wellness.utah.edu](http://www.wellness.utah.edu) or 801-581-7776.



**OEHS 6715 -- Occupational Solutions (Colisted with ME EN 6140)**

Spring 2022

Profs. Melissa Cheng, Scott Collingwood, and Kenneth d'Entremont

Monday 12:30-2:30 PM / Friday 8:00-10:30 AM

**Revision 0: 01/10/2022**

Week	Date	Day	Topics and Deliverables (In-Classroom)	Submissions (Outside of Classroom)	Notes
1	01/10/22	Monday	Introduction to Course by Instructors		
	01/14/22	Friday	Project: Site Visit--Group 1 (University of Utah, Environmental Health & Safety (Building 590))	Driver-Training completion ( <a href="http://risk.utah.gov/risk-training/2-risk/50-defensive-driver-training.html">http://risk.utah.gov/risk-training/2-risk/50-defensive-driver-training.html</a> )	Submit proof of completion via Canvas
2	01/17/22	Monday	Holiday: Martin Luther King, Jr. Day		No class
	01/21/22	Friday	Project: Site Visit--Group 2 (TBD)	Mini-Project: Topic Selection Book/Documentary: Topic Selection	
3	01/24/22	Monday	Guest Lecturer 1: TBD		
	01/28/22	Friday	Project: Site Visit--Group 3 (TBD)		
4	01/31/22	Monday	Guest Lecturer 2: Mr. Jerry Parkstone (one hour)	Guest Lecturer 1: Summary (TBD)	
	02/04/22	Friday	Project: Site Visit--Group 4 (TBD)		NORA 2022: Registration
5	02/07/22	Monday	Mini-Project: Presentations--Group A	Guest Lecturer 2: Summary (J. Parkstone) Mini-Project: Presentations--Group A (DOC & PPT)	
	02/11/22	Friday	Mini-Project: Presentations--Group B	Mini-Project: Presentations--Group B (DOC & PPT)	
6	02/14/22	Monday	Project: Scope of Work Presentations	Project: Scope of Work (DOC & PPT)	
	02/18/22	Friday	Mini-Project: Presentations--Group C	Mini-Project: Presentations--Group C (DOC & PPT)	
7	02/21/22	Monday	Holiday: Presidents Day		No class
	02/25/22	Friday			
8	02/28/22	Monday	Guest Lecturer 3: Dr. Eryn Stansfield (OM, Hill AFB)		
	03/04/22	Friday	Project: Background & Significance Presentations	Project: Background & Significance (DOC & PPT) Peer Evaluation: Mid-Term	
9	03/07/22	Monday	Holiday: Spring Break		No class
	03/11/22	Friday	Holiday: Spring Break		No class
10	03/14/22	Monday	Guest Lecturer 4: Taylor Perkins	Guest Lecturer 3: Summary (TBD) NORA: Abstract Draft (DOC)	
	03/18/22	Friday	Book/Documentary: Presentation--Group A	Book/Documentary: Presentation--Group A (DOC & PPT)	
11	03/21/22	Monday	Project: Methods Presentations	Guest Lecturer 4: Summary (Taylor Perkins) Project: Methods (DOC & PPT)	
	03/25/22	Friday	Book/Documentary: Presentation--Group B	NORA: Abstract (due via NORA 2022 website) Book/Documentary: Presentation--Group B (DOC & PPT)	NORA 2022 Abstract due. Find example abstract and information at: <a href="https://nora.mech.utah.edu/abstract-submission/">https://nora.mech.utah.edu/abstract-submission/</a>
12	03/28/22	Monday	Guest Lecturer 5: TBD		
	04/01/22	Friday	Book/Documentary: Presentation--Group C	Book/Documentary: Presentation--Group C (DOC & PPT)	
13	04/04/22	Monday	Project: Results & Discussion Presentations	Guest Lecturer 5: Summary (TBD) Project: Results & Discussion (DOC & PPT)	
	04/08/22	Friday	Guest Lecturer 6: TBD		
14	04/11/22	Monday	Project: Conclusions & Recommendations Presentations Project: Present Work to Client (schedule date/time with Client and Instructors)	Project: Conclusions & Recommendations (DOC & PPT) Peer Evaluation: Final	
	04/15/22	Friday	NORA: Presentation of Accepted NORA Presentation or Poster	Guest Lecturer 6: Summary (TBD) NORA: Presentation or Poster (PPT) Attendance & Participation	
15	04/18/22	Monday	Project: Final Presentation	Project: Final Paper & Presentation (DOC & PPT)	
	04/22/22	Friday	Attend NORA Symposium (on campus)		NORA 2022 on Thursday & Friday of this week
16	04/25/22	Monday	Project: Present Work to Client (with Instructors) Does not have to be on this date but should be around this date or week.	Project: Final Paper (DOC) Revised Project: Final Presentation (PPT) Revised	
	04/29/22	Friday	(Last day of courses: 04/26/22)		No class
17	05/02/22	Monday	Final-Exam Week		
			<i>All assignments due by 11:59 PM that date unless otherwise specified</i>		
			Holiday/No Class		
			Guest Lecturer		
			Deliverables submitted directly to NORA 2022 organizers		