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GENERAL DESCRIPTION

Students in the Industrial Hygiene and Hazardous Substance masters programs may be enrolled in either the Master of Public Health (MPH) or Master of Science (MS) degree in Environmental Health. The MPH, offered through the School of Public Health, is often thought to be a terminal degree for practitioners, although it is possible to proceed to the doctoral program after obtaining this degree. The MS, offered through the Graduate School, is meant for both practitioners and those contemplating careers in research or academic institutions. It can lead to further study toward the PhD.

There are very few differences between the two degrees as offered in the Industrial Hygiene and Hazardous Substance Programs. Coursework, practicum, thesis projects and other requirements are almost exactly the same for the MPH and MS degrees in either program. The differences between the two degrees are described in the next paragraph. Required and elective courses in the Hazardous Substance program differ slightly; thesis projects and field experiences must include elements of hazardous substance management. The differences between the IH and HSAT programs are outlined further on. NOTE: Students enrolled in the Hazardous Substance sub-program are considered students in the Industrial Hygiene program, as well.

The specific differences between the MPH and MS degree options are as follows:

• Students taking the MS degree must register for PubH 6742 Ethics in Public Health: Research and Policy, while those in the MPH degree must register for PubH 6741 Ethics in Public Health: Professional Practice and Policy.
• Students pursuing the MS degree must prepare a Research Paper for their Masters Project (PubH 7194). Students pursuing an MPH degree may prepare either a Research Paper or a Literature Review for their Masters Project.

During the past 30 years, the Industrial Hygiene Program has been funded in part by the National Institute for Occupational Safety and Health (NIOSH) under its Education and Research Center (ERC) Training scheme. That support provides financial assistance for qualified applicants. The NIOSH-funded sub-program in Hazardous Substances provides further opportunities and support for study for students interested in environmental aspects of occupational safety and health. The American Board of Engineering and Technology, Inc (ABET) accredits the Industrial Hygiene Program. A master’s degree from an ABET-accredited program will count for one year of work experience when applying for the certification (CIH) exam.

It is expected that the full program of study for the masters (MS or MPH) degrees in these two programs will be of two years duration, including courses, masters project and field experience. **Students are expected to take a minimum of 45 semester credits of coursework (excluding the master’s project and field experience). With the masters project (PubH 7194, 3 cr) and the field experience (PubH 7196, 3 cr), the total number of required credits is 51.**
# MASTER’S PROGRAM COURSEWORK

The following courses are required of MS and MPH students entering the Industrial Hygiene (IH) and Hazardous Substances Academic Training (HSAT) Programs during the 2008-2009 academic year. These courses will meet the requirements of the School of Public Health (SPH), Division of Environmental Health Sciences (EnHS), Occupational Health and Safety (OH&S), and the IH or HSAT Programs.

## School of Public Health Core Requirements:
(Note: Courses marked with * can be taken on-line during the summer)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubH 6020*</td>
<td>Fundamentals of Social and Behavioral Science</td>
<td>3 cr</td>
</tr>
<tr>
<td>PubH 6320*</td>
<td>Fundamentals of Epidemiology</td>
<td>3 cr</td>
</tr>
<tr>
<td>PubH 6741*</td>
<td>Ethics in Public Health: Professional Practice and Policy (MPH)</td>
<td>1 cr</td>
</tr>
<tr>
<td>PubH 6742*</td>
<td>Ethics in Public Health: Research and Policy (MS)</td>
<td>1 cr</td>
</tr>
<tr>
<td></td>
<td>One of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PubH 6414* Biostatistical Methods I</td>
<td>3 cr</td>
</tr>
<tr>
<td></td>
<td>PubH 6450 Biostatistics I</td>
<td>4 cr</td>
</tr>
<tr>
<td></td>
<td>One of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PubH 6751 Principles of Management in Health Service Organizations</td>
<td>2 cr</td>
</tr>
<tr>
<td></td>
<td>PubH 6752* Public Health Management</td>
<td>3 cr</td>
</tr>
</tbody>
</table>

## Division of Environmental Health Sciences Core Requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubH 6103</td>
<td>Exposure to Environmental Hazards</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6104</td>
<td>Environmental Health Effects: Introduction to Toxicology</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6105</td>
<td>Environmental and Occupational Health Policy</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 7194</td>
<td>Master's Project: Env. Health (Lit. Review or Research Paper) (MPH)</td>
<td>3 cr</td>
</tr>
<tr>
<td>PubH 7194</td>
<td>Master's Project: Environmental Health (Research Paper) (MS)</td>
<td>3 cr</td>
</tr>
<tr>
<td>PubH 7196</td>
<td>Field Experience: Environmental Health</td>
<td>3 cr</td>
</tr>
</tbody>
</table>

## Occupational Health and Safety Core Requirements:
(Note: Unless told otherwise, students must take the classroom version of PubH 6170 rather than the on-line version)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubH 6130</td>
<td>Occupational Medicine: Principles and Practice</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6150</td>
<td>Interdisciplinary Evaluation of OH&amp;S Field Problems</td>
<td>3 cr</td>
</tr>
<tr>
<td>PubH 6170</td>
<td>Introduction to Occupational Health and Safety</td>
<td>3 cr</td>
</tr>
</tbody>
</table>

## Industrial Hygiene Program Requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubH 6192</td>
<td>Measurement and Properties of Air Contaminants</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6193</td>
<td>Advanced Topics in Human Exposure Science</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6172</td>
<td>Industrial Hygiene Applications</td>
<td>2 cr</td>
</tr>
<tr>
<td>PubH 6173</td>
<td>Exposure to Physical Agents</td>
<td>2 cr</td>
</tr>
</tbody>
</table>
Control of Workplace Exposures 3 cr
Environmental Measurements Laboratory 2 cr
INDUSTRIAL HYGIENE ELECTIVES at least 6 cr

Additional Hazardous Substances Academic Training (HSAT) Program Requirements:
(Note: These courses partially fulfill the electives requirement for the IH Program)

Hazardous Materials and Waste Management 2 cr

One of the following:

Environmental Chemistry 3 cr
Solid Hazardous Wastes 3 cr

40-hour Continuing Education Class (for example, one of the following from CPHEO):
(i) Safety and Health Training for Hazardous Waste Site Personnel 40 Hour Training
(ii) Hazardous Materials Emergency Response 40 Hour Training

Industrial Hygiene Electives:
Risk Analysis: Application to Risk-Based Decision Making 3 cr
Foundation of Environmental and Worker Protection Law 1 cr
Worker Protection Law 1 cr
Environmental Law 1 cr
Injury Prevention in the Workplace, Community, and Home 2 cr
Occupational and Environmental Epidemiology 2 cr
Regulatory Toxicology 2 cr
Hazardous Materials and Waste Management 2 cr
Environmental Chemistry 3 cr
Air Pollution 3 cr
Biostatistical Methods II 3 cr
Biostatistics II 4 cr
Personal Protective Equipment and Respiratory Protection 1 cr
Ergonomics and the Prevention of Workplace Injuries 1 cr
Safety/Env. Hlth. Issues in Plant/Animal Production/Processing 3 cr
Solid Hazardous Wastes 3 cr
Environmental Microbiology Laboratory 4 cr
Environmental Law for Engineers 3 cr
Human Factors and Work Analysis 4 cr
Engineering Safety 4 cr
Foundations of Human Factors/Ergonomics 3 cr
Aerosol/Particle Engineering 4 cr
Aerosol Measurement Lab 4 cr
Introduction to Nanoparticle Science & Engineering 3 cr

Other courses approved by your advisor

MINIMUM TOTAL CREDITS: 51 credits

EXAMPLE IH STUDENT COURSE PLAN (MPH OR MS STUDENT NOT IN HSAT PROGRAM)

PLEASE NOTE: This course plan is an example; individual course plans may vary depending on
the needs and interests of each student
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Days and Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubH 6192</td>
<td>Measurement and Properties of Air Contaminants</td>
<td>2 cr</td>
<td>W, F 12:20 – 2:15 (first 7 weeks)</td>
</tr>
<tr>
<td>PubH 6193</td>
<td>Advanced Topics in Human Exposure Science</td>
<td>2 cr</td>
<td>W, F 12:20 – 2:15 (last 7 weeks)</td>
</tr>
<tr>
<td>PubH 6103</td>
<td>Exposure to Environmental Hazards</td>
<td>2 cr</td>
<td>TuTh 5:45 – 7:40 (first 7 weeks)</td>
</tr>
<tr>
<td>PubH 6104</td>
<td>Environmental Health Effects</td>
<td>2 cr</td>
<td>TuTh 5:45 – 7:40 (last 7 weeks)</td>
</tr>
<tr>
<td>PubH 6170</td>
<td>Introduction to Occupational Health and Safety</td>
<td>3 cr</td>
<td>M 8:00 – 11:00</td>
</tr>
<tr>
<td>PubH 6414</td>
<td>Biostatistical Methods I</td>
<td>3 cr</td>
<td>TuTh 9:45 – 11:00 + lab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 cr</td>
<td></td>
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<tr>
<td></td>
<td><strong>Fall 1</strong></td>
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<tr>
<td></td>
<td><strong>Spring 1</strong></td>
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<td></td>
</tr>
<tr>
<td>PubH 6020</td>
<td>Fundamentals of Social and Behavioral Science</td>
<td>3 cr</td>
<td>on-line</td>
</tr>
<tr>
<td>PubH 6105</td>
<td>Env. and Occup. Health Policy (even years)</td>
<td>2 cr</td>
<td>Tu 6:00 – 7:55</td>
</tr>
<tr>
<td>PubH 6130</td>
<td>Occupational Medicine (even years)</td>
<td>2 cr</td>
<td>W 5:00 – 8:00 (first 10 weeks)</td>
</tr>
<tr>
<td>PubH 6150</td>
<td>Interdisciplinary…Field Problems</td>
<td>3 cr</td>
<td>Tu 10:10 – 1:10</td>
</tr>
<tr>
<td>PubH 6172</td>
<td>IH Applications (odd years)</td>
<td>2 cr</td>
<td>W 9:05 – 11:00</td>
</tr>
<tr>
<td>PubH 6173</td>
<td>Exposure to Physical Agents (even years)</td>
<td>2 cr</td>
<td>M 4:40 – 6:40</td>
</tr>
<tr>
<td>PubH 6174</td>
<td>Control of Workplace Exposures (odd years)</td>
<td>3 cr</td>
<td>M 4:40 – 7:40</td>
</tr>
<tr>
<td>PubH 6175</td>
<td>Environmental Measurements Laboratory (odd years)</td>
<td>2 cr</td>
<td>W 12:20 – 4:25</td>
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<tr>
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<td></td>
<td>12-13 cr</td>
<td></td>
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<tr>
<td></td>
<td><strong>Summer</strong></td>
<td></td>
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<tr>
<td>PubH 7196</td>
<td>Field Experience</td>
<td>3 cr</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3 cr</td>
<td></td>
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<tr>
<td></td>
<td><strong>Fall 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PubH 6320</td>
<td>Fundamentals of Epidemiology</td>
<td>3 cr</td>
<td>Tu 3:35 – 5:30 + lab</td>
</tr>
<tr>
<td>PubH 6741/2</td>
<td>Ethics in Public Health</td>
<td>1 cr</td>
<td>M 12:20 – 2:15 (half semester)</td>
</tr>
<tr>
<td>PubH 6752</td>
<td>Public Health Management</td>
<td>3 cr</td>
<td>TuTh 1:25 – 2:40</td>
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<tr>
<td></td>
<td>INDUSTRIAL HYGIENE ELECTIVE</td>
<td>2-4 cr</td>
<td></td>
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<tr>
<td></td>
<td>INDUSTRIAL HYGIENE ELECTIVE</td>
<td>2-4 cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-15 cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Spring 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PubH 6105</td>
<td>Env. and Occup. Health Policy (even years)</td>
<td>2 cr</td>
<td>Tu 6:00 – 7:55</td>
</tr>
<tr>
<td>PubH 6130</td>
<td>Occupational Medicine (even years)</td>
<td>2 cr</td>
<td>W 5:00 – 8:00 (first 10 weeks)</td>
</tr>
<tr>
<td>PubH 6172</td>
<td>IH Applications (odd years)</td>
<td>2 cr</td>
<td>W 9:05 – 11:00</td>
</tr>
<tr>
<td>PubH 6173</td>
<td>Exposure to Physical Agents (even years)</td>
<td>2 cr</td>
<td>M 4:40 – 6:40</td>
</tr>
<tr>
<td>PubH 6174</td>
<td>Control of Workplace Exposures (odd years)</td>
<td>3 cr</td>
<td>M 4:40 – 7:40</td>
</tr>
<tr>
<td>PubH 6175</td>
<td>Environmental Measurements Laboratory (odd years)</td>
<td>2 cr</td>
<td>W 12:20 – 4:25</td>
</tr>
<tr>
<td>PubH 7194</td>
<td>Master's Project</td>
<td>3 cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>INDUSTRIAL HYGIENE ELECTIVE</td>
<td>2-4 cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11-14 cr</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL CREDITS (ASSUMING 6 ELECTIVE CREDITS)</strong></td>
<td>52 cr</td>
<td></td>
</tr>
</tbody>
</table>
EXAMPLE IH/HSAT STUDENT COURSE PLAN (MPH OR MS STUDENT IN HSAT PROGRAM)

PLEASE NOTE: This course plan is an example; individual course plans may vary depending on the needs and interests of each student.

**Fall 1**
- **PubH 6192** Measurement and Properties of Air Contaminants  2 cr  W,F 12:20 – 2:15 (first 7 weeks)
- **PubH 6193** Advanced Topics in Human Exposure Science  2 cr  W,F 12:20 – 2:15 (last 7 weeks)
- **PubH 6103** Exposure to Environmental Hazards  2 cr  TuTh 5:45 – 7:40 (first 7 weeks)
- **PubH 6104** Environmental Health Effects (odd years)  2 cr  TuTh 5:45 – 7:40 (last 7 weeks)
- **PubH 6170** Introduction to Occupational Health and Safety  3 cr  M 8:00 – 11:00
- **PubH 6176** Haz Materials and Waste Management (even years)  2 cr  W 9:05 – 11:00
- **PubH 6414** Biostatistical Methods I  3 cr  TuTh 9:45 – 11:00 + lab

**Total Credits for Fall 1**: 14 cr

**Spring 1**
- **PubH 6020** Fundamentals of Social and Behavioral Science  3 cr  on-line
- **PubH 6105** Env. and Occup. Health Policy (even years)  2 cr  Tu 6:00 – 7:55
- **PubH 6130** Occupational Medicine (even years)  2 cr  W 5:00 – 8:00 (first 10 weeks)
- **PubH 6150** Interdisciplinary…Field Problems  3 cr  Tu 10:10 – 1:10
- **PubH 6172** IH Applications (odd years)  2 cr  W 9:05 – 11:00
- **PubH 6173** Exposure to Physical Agents (even years)  2 cr  M 4:40 – 6:40
- **PubH 6174** Control of Workplace Exposures (odd years)  3 cr  M 4:40 – 7:40
- **PubH 6175** Environmental Measurements Laboratory (odd years)  2 cr  W 12:20 – 4:25

**Total Credits for Spring 1**: 12-13 cr

**Summer**
- **PubH 7196** Field Experience  3 cr  Non-credit (taken as schedule permits)

**Fall 2**
- **PubH 6104** Environmental Health Effects (odd years)  2 cr  TuTh 5:45 – 7:40 (last 7 weeks)
- **PubH 6176** Haz Materials and Waste Management (even years)  2 cr  W 9:05 – 11:00
- **PubH 6320** Fundamentals of Epidemiology  3 cr  Tu 3:35 – 5:30 + lab
- **PubH 6741/2 Ethics in Public Health**  1 cr  M 12:00 – 2:15 (half semester)
- **PubH 6751** Principles of Management  2 cr  WF 1:25 – 3:20 (half semester)
- One of the following:
  - **PubH 6190** Environmental Chemistry (HSAT ELECTIVE)  3 cr  TuTh 1:25 – 2:40
  - **INDUSTRIAL HYGIENE ELECTIVE**  1-4 cr

**Total Credits for Fall 2**: 9-12 cr

**Spring 2**
- **PubH 6105** Env. and Occup. Health Policy (even years)  2 cr  Tu 6:00 – 7:55
- **PubH 6130** Occupational Medicine (even years)  2 cr  W 5:00 – 8:00 (first 10 weeks)
- **PubH 6172** IH Applications (odd years)  2 cr  W 9:05 – 11:00
- **PubH 6173** Exposure to Physical Agents (even years)  2 cr  M 4:40 – 6:40
- **PubH 6174** Control of Workplace Exposures (odd years)  3 cr  M 4:40 – 7:40
- **PubH 6175** Environmental Measurements Laboratory (odd years)  2 cr  W 12:20 – 4:25
- **PubH 7194** Master's Project  3 cr

**Total Credits for Spring 2**: 3 cr

**Total Credits (assuming 2 IH Elective credits)**

52 cr
FIELD EXPERIENCE

The requirement for field experience in environmental health (PubH 7196) is described in the 2009-2010 Student Guidebook for the Environmental Health MS and MPH degree programs. Please read this description carefully. The field experience is an important component of the Industrial Hygiene and Hazardous Substance programs; it is usually pursued during the summer between first and second year.

Other options are available for fulfilling the field experience requirement, including part-time arrangements during the academic year. This should be arranged in consultation with your academic advisor. If you have previous relevant work experience and wish to be exempted from this requirement, you should first consult with your advisor. Generally, even those with previous experience are encouraged to consider doing additional field work, as another work experience in a different setting can broaden one’s perspectives and skills.

Generally, announcements for field experience opportunities are received by the faculty or Division and communicated directly to students. You are then expected to contact the location directly. It is recommended that you begin their search for an appropriate field experience during early spring semester. Faculty do not generally become personally involved in screening students or arranging internships. However, if you are seeking some particular type of experience your advisor may be able assist in identifying specific contacts or locations.

You must discuss your field experience plans with your academic advisor to assure that it meets expectations for an experience relevant to industrial hygiene. In general, faculty expect that these experiences should offer some variety in activities (a mixture of office and in-plant work) which encompass the full range of typical industrial hygiene principles (anticipating, recognizing, evaluating, and controlling hazards).

Field experiences should not consist of singular, office-related activities, such as reviewing material safety data sheets. An example of an appropriate field experience is one which offers a student an opportunity to:

- participate in exposure assessment
- measure or design ventilation systems or other controls
- write reports in which they describe results and make recommendations
- participate in decision-making and other opportunities which help them understand the role of an industrial hygienist in the organization
- observe and evaluate a variety of hazards
- interact with a broad range of people, including employees, engineers, management and health and safety professionals
- think creatively and apply their learning to specific problems and situations
- practice and learn new skills appropriate to the field

Students in the HSAT program must select a field experience that contains some elements of hazardous materials/wastes management. You should discuss a specific internship with their academic advisor to ensure this requirement is met.
You are expected to complete the form, Record of Student Field Experience in Environmental Health, prior to the start of their field experience. In Section F of this Form, you should include a discussion of how this experience meets the expectations described above. It is highly recommended that the student discuss these expectations and the planned field experience with both the preceptor and the advisor prior to completion of the form.

If expectations are not met or the job description changes during the field experience, this should be communicated to the advisor. A revised form may be necessary in some circumstances. Students who fail to complete this form within the first two weeks of beginning the field experience may risk receiving a failing grade in this course upon completion of the field experience.

Upon completion of the field experience, you must submit a 2-3 page report to your advisor that describes, in detail, how your work experience fulfilled the expectations described above and met the statement of activity in your completed form. Your advisor will then certify completion of the field experience by completing the final section of the form and submitting a grade (satisfactory/non-satisfactory). You will receive an incomplete until the field experience report has been completed. You are encouraged to submit this report as soon as possible after completing your field experience.

Students may combine their field experience and masters project. This requires careful consultation with your academic advisor (who oversees field experience), your masters project advisor (if different from the academic advisor) and your field experience supervisor. It is strongly recommended that a face-to-face meeting with all of the involved individuals be arranged during the early part of the field experience, in which the specific project is discussed and arranged. The field experience supervisor should receive copies of the expectations for Research Projects from both the Environmental Health Student Guidebook and the Industrial Hygiene/Hazardous Substance Student Handbook. Your advisors will ensure that the supervisor clearly understands these expectations and the nature of their written and oral presentation. An organization may have trade secret and confidentiality issues with the written publication or oral reporting of sampling or other data. The advisor, with the student, should ensure that such issues are discussed and resolved prior to the start of the project work. The advisor or the preceptor may request a written agreement—if this is the case, it may be appropriate to ask the Division Head to review such an agreement.

See the section on Masters Project for more details. Keep in mind the requirements for human subjects approval. These requirements apply to the data from exposure sampling in which you are involved or that has been previously performed.

**MASTER’S PROJECT**

General requirements and guidelines for the master’s project (PubH 7194) are described in the Environmental Health Major Student Handbook and should be carefully reviewed.
Specific requirements and expectations for masters projects in the Industrial Hygiene and Hazardous Substances Academic Training programs are described here.

Students pursuing an MS degree are required to produce a research paper, which results from a single, data-based research project. Students pursuing a MPH degree may choose to complete either a research paper or a literature review.

You should select a topic area with a project advisor who has relevant experience. Your project advisor may be your academic advisor, another faculty member in the IH or HSAT programs, another faculty member in Environmental Health, or a faculty member external to the Division (but with the appropriate affiliation status). Additional faculty may be consulted, if necessary, for advice and input on your project’s design, implementation and presentation.

You should complete a Proposal Form once you have determined your topic. This should be submitted to your project advisor near the start of work on the project. Students are also encouraged to develop an outline (an example is included in this handbook) early in the project and submit this to the project advisor for review and comment.

Students should submit a written report to the project advisor as soon as possible after completion of the research project. The project advisor may return the thesis for changes; several drafts may be required before the thesis is considered acceptable. Once the written report is considered acceptable it must be submitted to your academic advisor for approval. After both advisors (project and academic) have approved your project, you may schedule your oral presentation.

With the help of your advisors, you should identify two additional faculty members to participate in the oral examination. These are typically people who have some expertise or interest in the thesis topic. Graduate school requirements for the MS degree indicate that two of the committee members should be from the student’s major and one should be from a minor or related field. The latter requirement means that students must identify a faculty person external to the Division (in other Division or Department) as the third member of their committee. It should also be kept in mind that all faculty must have an appointment in the Graduate School. While the requirements for the MPH are not as clearly defined, it is strongly recommended that students select a third member of their committee from outside the Division.

You should allow at least 1½ hours for your oral exam. At the oral examination, you will make a short oral presentation (using overheads or slides), which should take no longer than 30 minutes. Committee members may ask you questions on the specifics of your project or on more general, but related subjects from your course of study.

**Research Paper (MS or MPH degrees) Guidelines (IH and HSAT Programs)**

Be sure to review the guidelines in the Environmental Health Student Guidebook. In addition,
1. The project should address a theme relevant to the key principles of industrial hygiene: anticipating, recognizing, evaluating and controlling hazards.

2. The paper should address a specific problem and complete all of the steps required to address that problem, proceeding from its description and definition to methods for evaluating and controlling the problem. It is not necessary that controls be implemented as long as a discussion of the control options and their advantages and disadvantages are included.

3. A review of original literature should be carried out and described in the written project report.

4. The project may be carried out either in the laboratory or in a field setting (or a combination of these).

5. There must be some aspect of data gathering, in collaboration with a research advisor or another individual (e.g., field experience supervisor).

6. There should be an evaluation of the data (statistically, or otherwise).

7. The paper should include a discussion of the limitations of the data and how these limitations might be eliminated in the future.

Additional Requirements for HSAT Students Undertaking a Research Paper

MS Students in the Hazardous Substance program must select a topic that includes both industrial hygiene and hazardous substance management issues. This topic should be discussed with both the research and academic advisors to ensure this requirement is met. In rare cases, it may not be possible to include elements of hazardous substance management in the project. In consultation with their academic advisor, an HSAT student may design a separate, shorter project (e.g., a paper) that focuses on a problem or issue in hazardous substance management.

Literature Review (MPH degree) Guidelines (IH and HSAT Programs)

Follow the guidelines included in the Environmental Health Student Guidebook.

HUMAN SUBJECTS

Keep in mind that the University of Minnesota Research Subjects Protection Program must approve all data-gathering for a thesis project that involves human subjects before it is begun. If you are using data previously gathered from human subjects (e.g., exposure sampling data), you must also obtain approval from this Program before undertaking your project. See the Environmental Health Student Guidebook for more details on human subjects requirements and approval.

COURSE EXEMPTION POLICY

Courses required for the Environmental Health major carry individual policies concerning exemption. Consult the Environmental Health Student Guidebook or the lead instructors for information about these policies.
Exemptions from course requirements in the Industrial Hygiene and Hazardous Substance programs may be granted by the lead faculty for a course. The only exception to this is for the Field Experience; an exemption to this must be approved by both the academic advisor and the Program Director.

Generally, the student is asked to provide documentation in the form of a transcript, course description, and course outline to demonstrate that the coursework has already been covered elsewhere. It is entirely up to the lead faculty to determine the applicability of other coursework. The lead faculty may also require students to take an exemption-qualifying exam. If the exemption is granted, the student’s documentation and a letter from the faculty are placed in the student’s file.
PROFESSIONAL ORGANIZATIONS

American Industrial Hygiene Association
The American Industrial Hygiene Association (AIHA) is a national organization for professionals working in the field of industrial hygiene or related fields. With approximately 15,000 members, this organization is based in Washington DC and carries out considerable lobbying and volunteer-based activities (through committees and other groups). Many states have one or more local sections of the AIHA, which are affiliated with the national association. Membership in the national organization (AIHA) is separate from membership in the local sections. The AIHA organizes and sponsors the American Industrial Hygiene Conference and Exposition each year (usually held in May or June). The organization publishes a long-standing industrial hygiene journal: *AIHA Journal*. (Web site: [http://www.aiha.org/](http://www.aiha.org/))

The Upper Midwest Section of the AIHA has members from North and South Dakota, Minnesota, and Wisconsin. This section has regular meetings during the year (September to June), usually at lunchtime on the third Thursdays of the month. The membership fee is very reasonable and the section will subsidize half the cost of meetings for students (luncheon meetings are usually about $15-20). It is highly recommended that you consider joining this group and participating in their meetings, which are an excellent way to meet alumni, many of who are familiar with internships and other opportunities in the Twin Cities. An additional perk is a regular annual membership directory.

American Board of Industrial Hygienists
The American Board of Industrial Hygienists (web site: [http://www.abih.org/](http://www.abih.org/)) is the certifying organization for the profession. Certification is an important step for most industrial hygienists—you are encouraged to review the educational, work and other requirements for obtaining and maintaining certification.

American Conference of Governmental Industrial Hygienists
The American Conference of Governmental Industrial Hygienists (ACGIH) is a second important professional organization comprised of industrial hygienists in research, academia, and government organizations. Industrial hygienists who work for businesses may be affiliate members, but do not have voting privileges. As a student, you are eligible for a student membership with this organization. (Web site: [http://www.acgih.org/](http://www.acgih.org/))

The ACGIH has a number of technical committees, the foremost of which address Threshold Limit Values, Ventilation, Air Sampling Instruments, and Air Sampling
Procedures. The organization also publishes a monthly journal: *Applied Occupational and Environmental Hygiene*.

**Academy of Certified Hazardous Materials Managers**

The Academy of Certified Hazardous Materials Managers (ACHMM) is a professional organization that focuses on hazardous materials management. It is comprised of 54 chapters with 7000 members; its headquarters are in Rockville MD. (Web site: [http://qn.qn.net/~achmm/](http://qn.qn.net/~achmm/)) The Academy sponsors an annual conference.

The local North Star Chapter (web site: [http://www.achmm-nsc.org/](http://www.achmm-nsc.org/)) has a student membership fee (you can register on-line). This organization has regular meetings and a newsletter.

**Institute of Hazardous Materials Management**

The Institute of Hazardous Materials Management (IHMM) is also located in Rockville MD (Web site: [http://vf.cyclenet.com/cow/mall/ihmm/index.html](http://vf.cyclenet.com/cow/mall/ihmm/index.html)). This organization manages the Certified Hazardous Materials Manager (CHMM) program, a certification in hazardous materials management based on work experience, education and a written test. This certification may be important for those industrial hygienists seeking professional work in the area of hazardous substances.

**American Society of Safety Engineers**

The American Society of Safety Engineers (ASSE) is a professional organization with 139 chapters and 54 student sections throughout the United States. The organization publishes the Professional Safety Journal and a newsletter and offers an annual conference. (Web Site: [http://www.asse.org/home.htm](http://www.asse.org/home.htm)). A membership application can be downloaded from the web site.
FINANCIAL SUPPORT

The Industrial Hygiene and Hazardous Substance programs have received funding to support masters and doctoral students from NIOSH, as a member of the NIOSH Education and Research Center. These funds are dependent on a number of factors, including U.S. congressional support of NIOSH, NIOSH support of individual programs, and the individual program’s success in meeting NIOSH expectations. The NIOSH funds are available to United States citizens only.

The Industrial Hygiene program has been able to provide support in the form of tuition and stipend to most incoming masters and doctoral students who are U.S. citizens. It is our expectation that this funding will continue, dependent on those issues we described above. Generally, we have been able to award full tuition support and a stipend to first-year master’s students and full tuition to second-year students. Availability of stipend support for second-year students has varied. These awards do not carry any expectations with respect to an awardee’s activities, other than to attend classes and maintain acceptable progress toward a degree.

NIOSH awardees in the full-time masters program are eligible to receive some support for travel to and expenses related to attendance at one of the American Industrial Hygiene Conference and Expositions (AIHce) while they are pursuing their degree. These funds are entirely contingent on availability (tuition and stipend needs have first priority). The expectations for students wishing to receive support for attendance at an AIHce are as follows:

a. You must present a poster in the student poster session. The deadline for abstracts to this session is usually sometime in March. Check the AIHA website for more information about this.

b. You must attend at least two full technical sessions (technical paper presentations or roundtables) while at the conference (or the equivalent). You must demonstrate your attendance at these sessions by submitting a short paper (2-3 pages) describing what you learned.

Other Sources of Financial Support

3M Scholarship

Each year, the 3M Company sponsors a scholarship, which pays the costs of attending the AIHCE, and carries an award of $3000. Students must apply for the scholarship, usually in March; materials will be sent to the faculty and forwarded to you.

American Industrial Hygiene Foundation Scholarships

The American Industrial Hygiene Foundation (AIHF, part of the AIHA) sponsors a variety of different scholarships. Most of these require specific application by the program faculty in order for students to be eligible for funding. You should discuss your
interest in being nominated for these scholarships with your faculty advisor or program director.

The AIHF sponsors three named scholarships: The American Industrial Hygiene Association Scholarship, the Clyde Berry Scholarship and the TSI/Arthur J Abrams Scholarship. The AIHA Scholarship generally available to all students in an ABET-accredited graduate program. The Clyde Berry scholarship gives special preference for University of Cincinnati students; the TSI/Arthur J Abrams Scholarship is intended for students attending schools in Minnesota.

Teaching Assistantships and Research Assistantships

Teaching Assistant and Research Assistant positions may be available with faculty in the Division of Environmental and Occupational Health. These provide excellent opportunities to gain experience in teaching and research; they also serve as a means of reducing tuition costs (a 25% RA position, for example, will reduce tuition costs by 50%; a 50% position reduces tuition to nothing).
INDUSTRIAL HYGIENE CODE OF ETHICS

This code of ethics has been adopted by all of the major professional organizations for the field.

Objective
This canon provides standards of ethical conduct for Industrial Hygienists as they practice their profession and exercise their primary mission to protect the health and well-being of working people and the public from chemical, microbiological, and physical health hazards present at, or emanating from, the workplace.

Canons of Ethical Conduct

Industrial Hygienists shall:

1. Practice their profession following recognized scientific principles with the realization that the lives, health, and well-being of people may depend upon their professional judgment and that they are obligated to protect the health and well-being of people.

2. Counsel affected parties factually regarding potential health risks and precautions necessary to avoid adverse health effects.

3. Keep confidential personal and business information obtained during the exercise of industrial hygiene activities, except when required by law or overriding health and safety considerations.

4. Avoid circumstances where a compromise of professional judgment or conflict of interest may arise.

5. Perform services only in the areas of their competence.

6. Act responsibly to uphold the integrity of the profession.
Student Posters and Abstracts

As described above, if students wish to receive support for travel to the AIHce, usually held in May or June, they must deliver a poster presentation at the student poster session, usually held on Thursday afternoon of the conference week. The abstract deadline for this poster session is usually toward the end of March—your faculty will inform you of the exact date when it is published. The industrial hygiene faculty at the University of Alabama in Birmingham manages this program; Drs. Brosseau and Raynor have served as one of the faculty reviewers of these abstracts in the past. Abstracts are submitted online at the AIHA website (www.aiha.org).

What to present? Two common sources of data for a poster are 1) project work undertaken in courses (e.g. PubH 6175 Environmental Measurements Laboratory) and 2) masters research projects. Faculty in the IH Program can assist you in identifying poster subjects.

The abstract must follow the guidelines outlined in the abstract form, with some additions:

a. The name of your faculty advisor or course instructor (as appropriate) must be included in the abstract and listed as the second author.

b. Your primary affiliation should be with the University of Minnesota. If you performed this work elsewhere (e.g. a company) you must be sure to obtain permission from the company before submitting the abstract. Your affiliation with this company may be indicated in the body of the abstract, if necessary. Your University of Minnesota affiliation should be listed after your name in the abstract title.

c. Since abstracts may need to be re-written in a timely fashion after they are reviewed, you should list your address as: Division of Environmental Health Sciences, University of Minnesota, School of Public Health, Mayo Mail Code 807, 420 Delaware St SE, Minneapolis MN 55455. The fax number should be 612-626-4837 and you should indicate both your home phone number and the appropriate faculty’s phone as well. You should also include both your and the faculty’s email addresses.

It is strongly suggested that you ask Drs. Ramachandran, Brosseau or Raynor to review your abstract, as they are familiar with the criteria and expectations for abstracts.
FACULTY INFORMATION

The faculty of the Industrial Hygiene and Hazardous Substance programs are:

Ramachandram Gurumurthy, PhD, CIH
Professor
Office: 612-626-5428
FAX (Division): 612-626-4837
email: ramac002@umn.edu

Lisa M. Brosseau, ScD, CIH
Associate Professor
Director of the Industrial Hygiene and Hazardous Substances Programs
Office: 612-624-3143
FAX (Division): 612-626-4837
email: brosseau@umn.edu

Peter Raynor, PhD
Assistant Professor
Office: 612-625-7135
FAX (Division): 612-656-4837
email: praynor@umn.edu

The research interests and other activities of each faculty member are described in detail on the Division’s web page: [http://www.enhs.umn.edu](http://www.enhs.umn.edu)
ADVISOR ROLES AND RESPONSIBILITIES

When you enter the program you will be assigned an academic advisor from among the program’s faculty. This advisor is responsible for working with advisees to ensure they progress through the program in a timely manner, fulfilling the School, Division and Program requirements. You should arrange to meet with you advisors at least once each semester to discuss your plans and progress.

You are responsible for selecting your project advisor. Your academic advisor may serve as your project advisor, or you may select a separate research advisor for your master’s project. This will depend on the nature of your research project. In general, your research advisor should be selected from among the IH program faculty, although exceptions to this may be possible.

Your research advisor is generally selected at the end of the first year. This person is responsible for working closely with you on your project, ensuring that you are moving toward completion in a timely manner. Meetings with your research advisor may occur frequently as you pursue your project.
SUPPORT FOR THESIS RESEARCH

Student research can be supported in a variety of ways. If the project is performed at an external location, the work may be supported by that location. If the research is associated with a research grant or contract there may be funding available for equipment and supplies. If the student requires a small amount of funding for equipment or supplies s/he may request monies from the program director, in consultation with the thesis advisor. Many projects do not require support. Generally, salary support for performing research is not available and should not be an expectation on the part of the student.
CERTIFICATION

Becoming a Certified Industrial Hygienist (CIH) is an important goal for many people in this profession. While this program is not specifically designed to either address or assure certification, the preparation received should be more than adequate for the certification examination. Students are strongly encouraged to read a description of the CIH process, found on the ABIH web site (http://www.abih.org/). It should be noted that a masters degree from a program with ABET accreditation (such as the University of Minnesota) will count toward one year of work experience.
ACCREDITATION

The American Board for Engineering and Technology, Inc. serves as the accrediting organization for masters-level industrial hygiene programs. The University of Minnesota has received accreditation, which is granted in six-year blocks. Both degrees (MS, MPH) in industrial hygiene are accredited through September 30, 2008. One of the requirements of accreditation is that your degree or transcript reflects your program—thus, when you complete this program the designation of industrial hygiene will be listed on your transcript.
EDUCATIONAL OBJECTIVES

The mission of the Industrial Hygiene Masters Program is to produce graduates who within three years of graduation are able to:

- Demonstrate a high level of technical and scientific competence in recognizing, evaluating and controlling occupational and environmental hazards.
- Be able to solve complex problems through a combination of observation, literature review, measurement and data analysis.
- Communicate effectively both orally and in writing with a wide range of constituents.
- Design and develop long-range goals and programs.
- Act and behave responsibly and ethically according to the industrial hygiene professional code of ethics.
- Understand the limits of their graduate education and seek on-going education and work experience for their professional advancement leading to professional certification.
- Be able to interact competently and professionally at all levels of an organization working as a fully-contributing member of a team and accepting independent work responsibilities with a high level of self-discipline.
- Use skills to benefit the community in recognizing work and environmental hazards and educating those responsible for eliminating these hazards.
PROGRAM OUTCOMES

Program Outcomes
In the broadest sense, the Industrial Hygiene Masters Program prepares students for professional practice, which means they will work toward the solution of a broad range of problems in a variety of settings. More specifically, this program is designed to develop knowledge and skills in the six key areas of Recognition, Evaluation, Control, Communication, Behavior and Management. For each of these key areas we expect students upon graduation to be able to:

Recognition
R1. Identify health hazards of workplace processes and operations
R2. Understand the relationship between exposures and health outcomes
R3. Understand, interpret and apply occupational and environmental regulations
R4. Identify and describe quantitative and qualitative aspects of hazards associated with specific sources and processes
R5. Describe physical and chemical aspects of the generation of hazards
R6. Recognize the influence of cultural and social factors in occupational health practices

Evaluation
E1. Design and initiate research
E2. Gather, manage, and analyze data
E3. Assess risks to population health
E4. Interpret and apply scientific findings
E5. Measure and evaluate health and safety programs
E6. Understand quantitative and qualitative aspects of exposure assessments, dose response, and risk characterization
E7. Calculate, interpret, and apply statistical and epidemiological data
E8. Design and implement an appropriate exposure assessment strategy
E9. Understand basic principles of air sampling and its use for evaluating exposures and controls
E10. Understand the interpretation and use of exposure guidelines
E11. Prioritize hazards and exposures and the actions necessary for eliminating or controlling them

Control
Con1. Design and implement work process interventions
Con2. Recommend, evaluate and implement appropriate engineering, administrative and personal protective controls
Con3. Select the most appropriate hazard control method(s) for a given situation
Con4. Validate the effectiveness of selected hazard control methods
Communication
Com1. Communicate effectively with variety of stakeholders (e.g. management, labor, etc.)
Com2. Produce effective written communication through scientific and technical summaries and reports
Com3. Interpret and disseminate policies
Com4. Design and deliver adult education programs
Com5. Communicate effectively with other safety and health professionals

Behavior
B1. Demonstrate awareness of diversity in social and cultural beliefs
B2. Demonstrate the importance of appropriate ethical performance and practice
B3. Demonstrate familiarity with and be able to use professional code of ethics
B4. Understand and apply laws and regulations
B5. Function effectively on an interdisciplinary team
B6. Value professional development

Management
M1. Work collaboratively in a team
M2. Formulate and implement guidelines and policies
M3. Manage resources effectively
M4. Develop and implement health and safety programs
M5. Display effective leadership
ASSESSING PROGRAM OUTCOMES

You are the most important source of information about the effectiveness of this educational program. Therefore, we may ask you periodically for feedback on how well we have accomplished our program outcomes. At the end of each academic year, we have a student get-together, during which we gather your input about your courses, the program, etc. At the end of your program, we will ask you to complete an anonymous written survey. Your input is very important to us. Please feel free to share your comments with us throughout the time you are here.

As a graduate of the program, we may contact you periodically for your input on how well the program prepared you for your work. Please keep us informed of your latest work address and email, so we can keep our list up-to-date. Plus—we really want to hear what you’re doing!