CHEMICAL SCIENCES
The Chemical Science Track at Mount Wachusett Community College provides students with the opportunity to earn an Associate Degree in Liberal Arts and Sciences. Upon completion of the program, students are prepared to transfer to a four-year institution to complete a baccalaureate degree. The Chemical Science Track offers a student the opportunity to explore chemistry while completing a core curriculum used for transfer. Students will gain knowledge in a variety of disciplines including math, science, the humanities and the social sciences. The Liberal Arts and Sciences includes the MassTransfer Block.

Please click here for MassTransfer information (http://www.mass.edu/masstransfer)

CHEMICAL SCIENCES TRACK (LACH)
A DEGREE IN LIBERAL ARTS AND SCIENCES
This program is designed to prepare students to transfer in chemistry with an A.A. degree and MassTransfer benefits. Since many of these classes are two-semester sequential courses, it is recommended that students start this program in the fall.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>CHE 107</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>Behavioral Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Culturally Diverse Humanities Elective (See list below)</td>
<td>3</td>
</tr>
<tr>
<td>ENG 101</td>
<td>College Writing I</td>
</tr>
<tr>
<td>MAT 163</td>
<td>Pre-Calculus</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td>CHE 108</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>ENG 102</td>
<td>College Writing II</td>
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<tr>
<td>MAT 211</td>
<td>Calculus I</td>
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<tr>
<td>Non-behavioral Social Science Elective</td>
<td>3</td>
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<tr>
<td><strong>Year 2</strong></td>
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<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>CHE 207</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>MAT 212</td>
<td>Calculus II</td>
</tr>
<tr>
<td>PHY 120</td>
<td>Physics for Engineering and Science I</td>
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<tr>
<td>Culturally Diverse Literature Elective (see list below)</td>
<td>3</td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>CHE 208</td>
<td>Organic Chemistry II</td>
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<tr>
<td>PHY 121</td>
<td>Physics for Engineering and Science II</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>SPC 113</td>
<td>Speech (formerly THE113)</td>
</tr>
<tr>
<td><strong>Total Credits:</strong></td>
<td>60</td>
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</table>

1. Behavioral Social Sciences: ANT, PSY, SOC, SSC
2. Non-Behavioral Social Sciences: ECO, GEO, HIS, POL, SSC
3. Capstone Course
4. Social Sciences: ANT, ECO, GEO, HIS, POL, PSY, SOC, SSC

CULTURALLY DIVERSE HUMANITIES ELECTIVE

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>ART 109</td>
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<td>ART 110</td>
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<tr>
<td>ART 251</td>
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<tr>
<td>ART 252</td>
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<tr>
<td>Course Code</td>
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<tr>
<td>ART 259</td>
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<tr>
<td>ART 263</td>
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<tr>
<td>ASL - any American Sign Language course</td>
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<tr>
<td>DAN 133</td>
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<tr>
<td>ENG 221</td>
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<td>ENG 235</td>
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<td>ENG 236</td>
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<tr>
<td>ENG 237</td>
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<tr>
<td>ENG 261</td>
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<tr>
<td>FRE - any French course</td>
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<tr>
<td>HUM 240</td>
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<tr>
<td>HUM 260</td>
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<tr>
<td>MUS 106</td>
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<td>MUS 160</td>
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<td>PHL 201</td>
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<td>PHL 210</td>
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<tr>
<td>PHL 250</td>
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<tr>
<td>SPA - any Spanish course</td>
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**CULTURALLY DIVERSE LITERATURE ELECTIVES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENG 221</td>
<td>Women’s Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENG 235</td>
<td>Children’s Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENG 236</td>
<td>Modern Drama</td>
<td>3</td>
</tr>
<tr>
<td>ENG 237</td>
<td>Special Topics: Queer American Drama</td>
<td>3</td>
</tr>
<tr>
<td>ENG 261</td>
<td>The Short Story</td>
<td>3</td>
</tr>
</tbody>
</table>

See Chemical Sciences program student learning outcomes and technical standards

**Transfer options**

For transfer options, please click here. ([http://catalog.mwcc.edu/academicresources/#transferinformationtext](http://catalog.mwcc.edu/academicresources/#transferinformationtext)) It is recommended that you also consult with your academic advisor.

**MASSTRANSFER**

Students who plan to transfer to a Massachusetts state university or a University of Massachusetts campus may be eligible to transfer under the MassTransfer agreement, which provides transfer advantages to those who qualify.

Please click here for MassTransfer information ([http://www.mass.edu/masstransfer](http://www.mass.edu/masstransfer))

**PROGRAM COMPETENCIES FOR LACH**

Upon graduation from this program, students shall have the ability to:
• Formulate clear and precise questions about complex problems and ideas relevant to a variety of disciplines — math, science, the humanities, and the social sciences — and gather, assess, and interpret information to reach well-reasoned conclusions and solutions.

• Demonstrate an understanding of complex written texts that demand an appreciation of subtext, irony, metaphor, and the subtlety and nuances of language.

• Successfully complete a substantial scientific research paper that demonstrates the ability to formulate a research question, conduct research using the library’s databases, and synthesize information from a variety of sources into a cohesive and in-depth analysis of a topic.

• Demonstrate knowledge of historic, social, and cultural backgrounds necessary for understanding their own society and other societies, with an emphasis on important ideas and events that have shaped, and continue to shape, their world.

• Demonstrate scientific literacy, which can be defined as the matrix of knowledge needed to understand enough about the universe to deal with issues that come across the horizon of the average citizen, in the news or elsewhere.

• Demonstrate the ability to collect, record and organize scientific data correctly.

• Demonstrate the ability to work safely in a laboratory environment.

• Demonstrate the ability to manipulate and use scientific tools, such as the microscope, pH meter, measurement tools, glassware and other scientific instrumentation. This would include independently conducting an experiment using written directions such as lab manuals or Standard Operating Procedures as a guide.

• Demonstrate the ability to use mathematical tools as applied to science. This could include building and interpreting graphs, using equations and formulas to solve problems, and fitting data to a mathematical model.

• Demonstrate the ability to search scientific literature and use the information.

• Demonstrate a broad exposure to, and an understanding of, the differences and similarities in the various academic disciplines within their Liberal Arts education.

• Successfully transfer to a baccalaureate degree-granting institution if desired, with the proper educational foundation for transition into a chosen field of study.

TECHNICAL STANDARDS FOR LACH

For general information about technical standards and accommodation, see Technical Standards. (http://catalog.mwcc.edu/academicresources/academicandgradingpolicies/technicalstandards)

Students entering this program must be able to demonstrate the ability to:

• Comprehend textbook material at a college level.

• Communicate and assimilate information either in spoken, printed, signed, or computer voice format.

• Gather, analyze, and draw conclusions from data.

• Stand for a minimum of two hours.

• Differentiate by touch: hotness/coldness, wetness/dryness, and hardness/softness.

• Use the small muscle dexterity necessary to do such tasks as gloving, gowning, and operating controls on laboratory instrumentation.

• Respond promptly to spoken words, as well as monitor signals and instrument alarms.

• Identify behaviors that would endanger a person’s life or safety and intervene quickly in a crisis situation with an appropriate solution.

• Remain calm, rational, decisive, and in control at all times, especially during emergency situations.

• Manipulate small parts, and make fine hand adjustments to machines and test equipment.

• Operate a computer.

Courses

CHE 107. General Chemistry I. 4 Credits.
This course provides the student with an understanding of the fundamental principles of matter and energy. The course includes atomic and molecular structure, the periodic table, patterns of chemical reactivity, solution chemistry, stoichiometry, thermochemistry, and chemical bonding. A mathematical approach to chemical problems is used to develop problem solving skills as well as a conceptual understanding. Laboratory work is correlated with class discussion. Lab sessions will be hands-on experiences revolving
around and applying the topics listed in the lab section of the syllabus. Prerequisites: ENG 098, FYE 101, MAT 096 or MAT 162 or higher, RDG 098 or placement. Recommended: High school chemistry or other previous chemistry classes.

CHE 108. General Chemistry II. 4 Credits.
A continuation of CHE 107 General Chemistry I, this course covers such topics as intermolecular forces, behavior of gases, liquids and solutions, chemical kinetics, equilibrium, oxidation-reduction and electro-chemistry. A mathematical approach to chemical problems is used to develop problem solving skills as well as a conceptual understanding. Laboratory work is correlated with class discussion. Lab sessions will be hands-on experiences revolving around and applying the topics listed in the lab section of the syllabus. A grade of C or better in this course is required for advancement to CHE 207. Prerequisite: CHE 107.

CHE 120. Environmental Chemistry. 4 Credits.
This course is an introduction to the principles of chemistry with an emphasis on the environmental chemistry of air, energy, water and soil. It is recommended as a general science elective or as a foundation for continued study in the sciences, particularly natural resources. The following basic chemical topics will be introduced: matter classification, atomic structure, periodic table, chemical bonds, chemical formulas and names, spectroscopy, solutions, concentration, pH, moles and the use of energy. The course emphasizes an understanding of current environmental problems, such as air and water pollution, the ozone layer and energy issues. The relationships between science, technology and society are also discussed in the context of environmental issues. Lab sessions will be hands-on experiences revolving around and applying the topics listed in the lab section of the syllabus. Prerequisites: ENG 098, FYE 101, MAT 092, RDG 098 or placement. Fall.

CHE 180. Instrumental Analysis. 4 Credits.
This course provides an introduction to the use of instruments a Laboratory Quality Technician will encounter. The fundamentals of using instrumentation to measure chemical properties and concentrations will be covered; this will include sample preparation, calibration, and data analysis. The lab portion will provide hands-on experience with a variety of different analytical chemistry techniques and instruments (e.g. UV-VIS spectrophotometry, Infra-red spectrophotometry (FTIR), liquid chromatography, etc.) Some physical testing may also be included. Prerequisite: MAT 096 (or corequisite) or placement; CHE 107, CHE 120. Spring.

CHE 207. Organic Chemistry I. 4 Credits.
Organic chemistry is the study of carbon and its compounds. In the first semester, the structures and properties of the basic hydrocarbons and their simple substitution products will be studied. This will allow us to explore the following fundamental topics in organic chemistry: isomers, nomenclature, basic reaction mechanisms, spectroscopy (IR, NMR and MS). The functional groups will be introduced. Laboratory work will develop basic skills and techniques and be correlated with class discussion. Lab sessions will be hands-on experiences revolving around and applying the topics listed in the lab section of the syllabus. Prerequisites: CHE 108 with a grade of C or higher; MAT 163 (or corequisite). Fall.

CHE 208. Organic Chemistry II. 4 Credits.
Organic chemistry is the study of carbon and its compounds. In the second semester, the structures and properties of the substituted hydrocarbons (functional groups) will be studied. This will include their synthesis and their reactions. The use of spectroscopy (IR, NMR and MS) will be further developed. Multistep synthesis of complex organic compounds will be introduced. Laboratory work will develop more advanced skills and techniques, and be correlated with class discussion. Lab sessions will be hands on experiences revolving around and applying the topics listed in the lab section of the syllabus. A formal research lab report that incorporates previous scientific learning will be required in this course as a capstone experience. Prerequisites: CHE 207.