# **Department of Chemistry**

Undergraduate Coordinator: Deb MIsna

Advisors: Professors Joseph Emerson and Steven Gwaltney

1115 Hand Chemical Laboratory

Chemistry is concerned with the properties and compositions of substances and the transformations which they undergo. Because chemistry is a basic science to many careers, two undergraduate degree programs and three concentrations are offered to provide the needed flexibility for majors. These degrees are the B.S. and the B.A. degrees. A minimum of 124 hours is required for the B.S. degree and the B.A. degree. The department also offers the M.S. and the Ph.D. graduate degrees. Students in other majors may earn a minor in Chemistry by achieving at least a 2.00 average in a total of 22 hours of chemistry with 14 of the hours in upper-division courses and a minimum of 11 of the total hours completed at MSU.

The American Chemical Society (ACS) has continually approved the department and its curriculum since 1941, and awards a certificate to students who complete the ACS program with their BS degree. The ACS program is primarily intended as preparatory for graduate study in chemistry leading to a career in basic research. Graduates could also go directly into research and development positions in industry. Students seeking information on the ACS certification should contact a major advisor.

The B.A. degree program has a stronger liberal arts emphasis and could serve as a preparation for a secondary teaching career, chemical sales, or further study in a professional school.

# **B.S.** in Chemistry

# **General Education and Degree Requirements**

English Composition	on		
EN 1103	English Composition I		3
or EN 1163	Accelerated Composition I		
EN 1113	English Composition II		3
or EN 1173	Accelerated Composition II		
Foreign Language			
2 semesters - one Fo	oreign Language (see advisor)	· · · · · · · · · · · · · · · · · · ·	6

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Humanities		
Literature - see A	&S requirements	3
History - see A&S	requirements	3
Mathematics		
MA 1713	Calculus I	3
MA 1723	Calculus II	3
Fine Arts		
See A&S requiren	nents	3
<b>Natural Sciences</b>	3	
See Major Core -	Consult Advisor for specifics	9-12
Social Sciences		

Jocial Sciences		
Must be from 2 different areas	s and must be selected from University/ A&S Core	6
PSY 1013	General Psychology (required for pre-medicine)	
Major Core		
Student should check for prer	requisites for all courses. See advisor.	
CH 1141	Professional Chemistry: Paths	1
CH 1234	Integrated Chemistry I <sup>1</sup>	4
CH 1244	Integrated Chemistry II <sup>2</sup>	4
CH 2141	Professional Chemistry: Tools	1
CH 2311	Analytical Chemistry I Laboratory	1
CH 2313	Analytical Chemistry I	3
CH 3141	Professional Chemistry: Literature	1
CH 4141	Professional Chemistry: Research	1
CH 4213	Advanced Inorganic Chemistry I	3
CH 4351	Analytical Chemistry Laboratory II	1

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CH 4353	Analytical Chemistry II	3
CH 4554	Integrated Organic I <sup>3</sup>	4
CH 4564	Integrated Organic II 4	4
CH 4711	Senior Seminar	1
Oral Communication	Requirement	

Satisfied by successful completion of CH 1141, 2141, 3141, 4141, and 4711.

#### **Writing Requirement**

2

Satisfied by successful completion of CH 3141, 4141, and 4711.

#### **Computer Literacy**

Satisfied by successful completion of CH 1141, 2141, 2313, 3141, 4141, 4351, and 4711.

- CH 1234 can be replaced by CH 1213 and CH 1211
- 2 CH 1244 can be replaced by CH 1223 and CH 1221
- CH 4554 can be replaced by CH 4513 and CH 4511
- CH 4564 can be replaced by CH 4523 and CH 4521

Choose one of following paths to complete the B.S. degree:

# B.S. with non-A.C.S. certification

Choose one of the following:		4
CH 4413 & CH 4411	Thermodynamics and Kinetics and Physical Chemistry Laboratory I	
CH 4423 & CH 4421	Quantum Mechanics and Spectroscopy and Physical Chemistry Laboratory II	
CH 4403 & CH 4411	Biophysical Chemistry and Physical Chemistry Laboratory I	
CH 4403 & CH 4421	Biophysical Chemistry and Physical Chemistry Laboratory II	
Chemistry Elective <sup>1</sup>		6
PH 2213	Physics I	3
or PH 1113	General Physics I	
PH 2223	Physics II	3
or PH 1123	General Physics II	
PH 2233	Physics III	3
or PH 1133	General Physics III	
General Electives		
Number of credit hours need	led to bring the total number of credit hours to 124. Consult advisor.	43
Total Hours		124

Advisor approved chemistry or biochemistry courses 3000-level and above.

### A.C.S. concentration

CH 3213	Inorganic Chemistry	3
CH 4212	Advanced Inorganic Laboratory	2
CH 4413	Thermodynamics and Kinetics	3
CH 4411	Physical Chemistry Laboratory I	1
CH 4423	Quantum Mechanics and Spectroscopy	3
CH 4421	Physical Chemistry Laboratory II	1
CH 4603	Undergraduate Research	3
BCH 4603	General Biochemistry	3
PH 2213	Physics I	3
PH 2223	Physics II	3
PH 2233	Physics III	3

Semantal Electives   Semant	MA 0700	Colorduo III	2
Author of credit hours needed to bring the total number of credit hours to 124. Consult advisor.	MA 2733	Calculus III	3
Type-Medical consentation           Pre-Medical consentation           Student should check for presure usisites for all courses. See advisor.           All 4403         Biophysical Chemistry         4           All 4403         Biophysical Chemistry Laboratory I         3           All 4603         General Biochemistry         3           All 2213         Physics I         3           All 2213         Physics II         3           All 2223         Physics II         3           All 2223         Physics III         4           All 2223         Physics III         4           All 2223         Physics III         4           All 2223 <th< td=""><td></td><td></td><td></td></th<>			
Pre-Medical concentration  student should check for prerequisites for all courses. See advisor.  2H 4403		s needed to bring the total number of credit hours to 124. Consult advisor.	
######################################	Total Hours		124
### ### ### ### ### ### ### ### ### ##	Pre-Medical co	oncentration	
8 CH 44111         and Physical Chemistry Laboratory I           8 CH 4603         General Biochemistry         3           8 CH 4613         General Biochemistry         3           8 CH 2213         Physics I         3           8 CH 2213         Physics II         3           8 CH 2223         Physics II         3           8 CH 2233         Physics III         3           8 CH 2233         Physics III         3           8 CH 2233         Physics III         3           8 CH 2133         General Physics III         3           8 CH 4113         Biology I         4           8 O 1144         Biology I         4           8 O 2103         Cell Biology         4           8 O 304         General Microbiology         4           8 O 3504         General Microbiology         4           8 O 3504         Comparative Anatomy         4           8 O 4413         Immunology         4           8 O 4514         Animal Physiology         4 <tr< td=""><td>Student should check</td><td>for prerequisites for all courses. See advisor.</td><td></td></tr<>	Student should check	for prerequisites for all courses. See advisor.	
3CH 4603       General Biochemistry       3         3CH 4613       General Biochemistry       3         3CH 2213       Physics I       3         3CH 1113       General Physics II       3         3CH 2223       Physics II       3         3CH 2233       Physics III       3         3CH 2334       Biology       4         3CH 2434       Biology II       4         3CH 2413       Human Genetics       3         3CH 2413       Immunology       3         3CH 2413       Immunology       3         3CH 2414       Animal Physiology       4         3CH 2415       Animal Physiology       4         3CH 2415       Animal Physiology       4         3CH 2415       Animal Physiology       4	CH 4403	Biophysical Chemistry	4
3CH 4613       General Biochemistry       3         3PH 2213       Physics I       3         3PH 2223       Physics II       3         3PH 2223       Physics III       3         3PH 2233       Physics III       3         3PH 1133       General Physics III       3         3PH 1134       Biology I       4         3BO 1134       Biology II       4         3BO 2103       Cell Biology       4         3BO 2103       Cell Biology       3         3B OR 2473       Molecular Biology       3         3BO 3304       General Microbiology       4         3BO 3504       General Microbiology       4         3BO 3504       Comparative Anatomy       4         3BO 4413       Immunology       3         3BO 4514       Animal Physiology       4         3BO 4514       Animal Physiology       4         3BO 4515       Animal Physiology       4         3BO 4514	& CH 4411	and Physical Chemistry Laboratory I	
2H 2213       Physics I       3         2F H 2223       Physics II       3         2F H 2223       Physics II       3         2F H 2233       Physics III       3         2F P H 1133       General Physics III       3         2F P H 1134       Biology I       4         3B O 1134       Biology I       4         3B O 2103       Cell Biology       3         3B O 2103       Cell Biology       3         3B O 3304       General Microbiology       4         3B O 3103       General Microbiology       4         3B O 3504       Generics I       3         3B O 3504       Comparative Anatomy       4         3B O 4413       Immunology       3         3B O 4514       Animal Physiology       4         3B O 4514       Animal Physiology       4         3B O 4514       Animal Physiology       4         4B O 4515       Animal Physiology       4         4B O 4514       Animal Physiology       4         4B	BCH 4603	General Biochemistry	3
or PH 1113       General Physics II       3         or PH 1223       Physics II       3         or PH 1123       General Physics III       3         or PH 1133       General Physics III       3         or PH 1133       General Physics III       4         or PH 1134       Biology I       4         310 1134       Biology II       4         310 2103       Cell Biology       3         310 304       General Microbiology       4         310 303       General Microbiology       4         310 3103       Genetics I       3         310 3504       Comparative Anatomy       4         310 4133       Immunology       3         310 4514       Animal Physiology       4         360 4514       Animal Physiology       4         360 4514       Animal Physiology       4         37 45 45 45 45 45 45 45 45 45 45 45 45 45	BCH 4613	General Biochemistry	3
Physics   I   3   3   3   3   3   3   3   3   3	PH 2213	Physics I	3
or PH 1123         General Physics II           PH 2233         Physics III           or PH 1133         General Physics III           Technical and General Electives           SIO 1134         Biology I         4           BIO 2103         Cell Biology         3           BIO 2103         Cell Biology         3           BIO 3304         General Microbiology         4           BIO 3103         General Microbiology         4           BIO 3103         Genetics I         3           BIO 34133         Human Genetics         3           BIO 3504         Comparative Anatomy         4           BIO 3514         Animal Physiology         3           BIO 4514         Animal Physiology         4           BIO 4515         Animal Physiology         4           BIO 4516         Animal Physiology	or PH 1113	General Physics I	
PH 2233       Physics III       3         or PH 1133       General Physics III         Fechnical and General Electives       8         3BO 1134       Biology I       4         3BO 2103       Cell Biology       3         3BO 2103       Cell Biology       3         3BO 3304       General Microbiology       4         3BO 3103       Genetics I       3         3BO 3103       Genetics I       3         3BO 3504       Comparative Anatomy       4         3BO 4413       Immunology       3         3BO 4514       Animal Physiology       4         3BO 4514       Animal Ph	PH 2223	Physics II	3
or PH 1133         General Physics III           Fechnical and General Electives           SIO 1134         Biology I         4           SIO 2103         Cell Biology         3           SIO 2103         Cell Biology         3           SIO 3304         General Microbiology         4           SIO 3103         Genetics I         3           SIO 3103         Human Genetics         3           SIO 4413         Immunology         4           SIO 5414         Animal Physiology         4           Seneral Electives         Seneral Electives	or PH 1123	General Physics II	
Feechnical and General Electives           8IO 1134         Biology I         4           8IO 1144         Biology II         4           8IO 2103         Cell Biology         3           8IO 3304         Molecular Biology         4           8IO 3103         General Microbiology         4           8IO 3103         Genetics I         3           8IO 4133         Human Genetics         3           8IO 4413         Immunology         3           8IO 4514         Animal Physiology         4           General Electives	PH 2233	Physics III	3
Biology   Biol	or PH 1133	General Physics III	
Si	Technical and Gener	al Electives	
SIO 2103 Cell Biology  or BCH 4713 Molecular Biology  SIO 3304 General Microbiology 4  SIO 3103 Genetics I 3  or BIO 4133 Human Genetics  SIO 3504 Comparative Anatomy 4  SIO 4413 Immunology 3  SIO 4413 Animal Physiology 4  Seneral Electives  Sumber of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 1134	Biology I	4
Molecular Biology  General Microbiology  Generics I  Genetics I  G	BIO 1144	Biology II	4
BIO 3304 General Microbiology 4 BIO 3103 Genetics I 3 BIO 4133 Human Genetics BIO 3504 Comparative Anatomy 4 BIO 4413 Immunology 3 BIO 4514 Animal Physiology 4  General Electives  Wumber of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 2103	Cell Biology	3
BIO 3103 Genetics I 3 or BIO 4133 Human Genetics BIO 3504 Comparative Anatomy 4 BIO 4413 Immunology 3 BIO 4514 Animal Physiology 4 General Electives Wumber of credit hours needed to bring the total of credit hours to 124. Consult advisor.	or BCH 4713	Molecular Biology	
or BIO 4133 Human Genetics BIO 3504 Comparative Anatomy 4 BIO 4413 Immunology 3 BIO 4514 Animal Physiology 4  General Electives  Wumber of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 3304	General Microbiology	4
BIO 3504 Comparative Anatomy 4 BIO 4413 Immunology 3 BIO 4514 Animal Physiology 4  General Electives  Number of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 3103	Genetics I	3
BIO 4413 Immunology 3 BIO 4514 Animal Physiology 4  General Electives  Number of credit hours needed to bring the total of credit hours to 124. Consult advisor.	or BIO 4133	Human Genetics	
Animal Physiology  General Electives  Number of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 3504	Comparative Anatomy	4
General Electives  Number of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 4413	Immunology	3
Number of credit hours needed to bring the total of credit hours to 124. Consult advisor.	BIO 4514	Animal Physiology	4
	General Electives		
Total Hours	Number of credit hours	s needed to bring the total of credit hours to 124. Consult advisor.	
Otal Hours	Total Hours		124

# **Pre-Pharmacy Requirements**

The pre-pharmacy program is intended for students who wish to attend the School of Pharmacy at the University of Mississippi. Students may choose to obtain the B.S. with non-ACS certification degree or complete only the pre-pharmacy requirements, for which a degree is not awarded from MSU. The courses listed below will satisfy the requirements for the School of Pharmacy at the University of Mississippi. Most pharmacy schools have similar requirements. However, students who wish to attend other pharmacy schools should check the specific requirements for that school.

#### **Required Courses**

CH 1213	Chemistry I <sup>1</sup>	3
CH 1211	Investigations in Chemistry I <sup>1</sup>	1
CH 1223	Chemistry II <sup>2</sup>	3
CH 1221	Investigations in Chemistry II <sup>2</sup>	1
CH 4513	Organic Chemistry I <sup>3</sup>	3
CH 4511	Organic Chemistry Laboratory I <sup>3</sup>	1
CH 4523	Organic Chemistry II <sup>4</sup>	3
CH 4521	Organic Chemistry Laboratory II <sup>4</sup>	1
BCH 4603	General Biochemistry	3
or BCH 4013	Principles of Biochemistry	
BCH 4713	Molecular Biology	3
or BIO 2103	Cell Biology	

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BIO 1134	Biology I	4	
BIO 1144	Biology II	4	
BIO 3014	Human Physiology	4	
BIO 3304	General Microbiology	4	
BIO 4405	Pathogenic Microbiology	5	
BIO 4413	Immunology	3	
BIO 3103	Genetics I	3	
or BIO 4133	Human Genetics		
PHI 3323	Medical Ethics	3	
EN 1103	English Composition I	3	
EN 1113	English Composition II	3	
ST 2113	Introduction to Statistics	3	
MA 1713	Calculus I	3	
PH 1113	General Physics I	3	
PH 1123	General Physics II	3	
CO 1003	Fundamentals of Public Speaking	3	
EC 2123	Principles of Microeconomics	3	
Electives			
Social and Behavioral Scien	ice Electives <sup>5</sup>	6	
Humanities and Fine Arts El	lumanities and Fine Arts Electives <sup>6</sup>		
General Electives			

1 CH 1213 and CH 1211 can be replaced by CH 1234

To bring the total number of credit hours up to 92

- <sup>2</sup> CH 1223 and CH 1221 can be replaced by CH 1244
- 3 CH 4513 and CH 4511 can be replaced by CH 4554
- <sup>4</sup> CH 4523 and CH 4521 can be replaced by CH 4564
- At MSU EC 2113 Principles of Macroeconomics is a pre-requisite for the required course EC 2123 (see above), and EC 2113 will count as one social science elective. In addition to EC 2113 one course from either Psychology, Sociology, Political Science, or Anthropology is required.
- At least 3 credit hours required in each of the two main areas. Humanities Electives should be chosen from the areas: English Literature, Foreign Language, History, Religion or Philosophy

# **B.A.** in Chemistry

# **General Education and College Requirements**

#### **English Composition**

EN 1103	English Composition I		3
or EN 1163	Accelerated Composition I		
EN 1113	English Composition II		3
or EN 1173	Accelerated Composition II		
Foreign Language			
3 semesters - one Forei	gn Language (see advisor)		9
Humanities			
Literature - see General	Education courses		3
History - see General Ed	ducation courses		3
Philosophy - see A&S C	ore		3
Electives (Must be from	2 different areas) See A&S Core		9
Math			
See A&S requirements			6
Fine Arts			
See A&S requirements			3
<b>Natural Sciences</b>			
See Major Core - Consu	ılt advisor for specifics	9-	12

## Social Sciences

See A&S requirement	nts	6
Social Sciences Elec	ctives - See advisor <sup>5</sup>	12
Major Core		
Student should chec	k for prerequisites for all courses. See advisor.	
CH 1141	Professional Chemistry: Paths	1
CH 1234	Integrated Chemistry I <sup>1</sup>	4
CH 1244	Integrated Chemistry II <sup>2</sup>	4
CH 2141	Professional Chemistry: Tools	1
CH 2311	Analytical Chemistry I Laboratory	1
CH 2313	Analytical Chemistry I	3
CH 3141	Professional Chemistry: Literature	1
CH 3213	Inorganic Chemistry	3
or CH 4213	Advanced Inorganic Chemistry I	
CH 4141	Professional Chemistry: Research	1
CH 4554	Integrated Organic I <sup>3</sup>	4
CH 4564	Integrated Organic II <sup>4</sup>	4
CH 4711	Senior Seminar	1
Chemistry Electives	- See advisor <sup>6</sup>	7
PH 1113	General Physics I	3
or PH 2213	Physics I	
PH 1123	General Physics II	3
or PH 2223	Physics II	
PH 1133	General Physics III	3
or PH 2233	Physics III	
Oral Communication	on Requirement	
Satisfied by success	sful completion of CH 1141, 2141, 3141, 4141, and 4711.	
Writing Requireme	nt	
Satisfied by success	sful completion of CH 3141, 4141, and 4711.	
Computer Literacy		
Satisfied by success	ful completion of CH 1141, 2141, 2313, 3141, 4141, and 4711.	
General Electives		20-23
	urs needed to bring the total number of credit hours to 124. Consult advisor.	
Total Hours		124

- CH 1234 can be replaced by CH 1213 and CH 1211
- <sup>2</sup> CH 1244 can be replaced by CH 1223 and CH 1221
- <sup>3</sup> CH 4554 can be replaced by CH 4513 and CH 4511
- <sup>4</sup> CH 4564 can be replaced by CH 4523 and CH 4521
- Must be from 2 different areas and must cross 4 disciplines over the 18 hours. Only one Economics allowed.
- <sup>6</sup> Advisor approved chemistry courses 3000-level and above