

DEPARTMENT OF CHEMISTRY**Dr. Hongtao Yu, Professor and Chair****OFFICE: John A. Peoples Science Building, Room #414**

FACULTY: Professors: Y. Anjaneyulu, K. Lee, J. Leszczynski, W. McHenry, E. Noe, J. Perkins, H. Tachikawa, J. Watts, H. Yu, J. Zubkowski; Associate Professors: N. Campbell, A. Hamme, M. Huang, Y. Liu, R. Venkatraman; Assistant Professors: Z. Arslan, J. Choi, R. Gao, G. Hill, A. Hossain, P. Ray; Instructors/Adjunct Professors: E. Milner, T. Milliken, B. Wenzel

MISSION

To provide quality education to its diverse undergraduate and graduate students in fundamental, applied, and interdisciplinary areas of the chemical sciences. To carry out corresponding research activities leading to scientific discovery by its faculty, research personnel, and students. To use chemistry knowledge and technology to serve its surrounding and international communities.

OBJECTIVES

- To provide students with high quality educational programs with knowledge necessary for success in graduate school, professional school, and industrial or government entities.
- To maintain excellent research programs.
- To provide services to the community and the state.
- To promote the professional growth and development of the faculty.

The Department of Chemistry offers the Bachelor of Science degree with American Chemical Society Certification with concentrations in Biomedical Science, Environmental Science, and Forensic Science. Pre-professional programs in pre-medicine, pre-dentistry, pre-pharmacy, and pre-chemical engineering may be completed within the Bachelor of Science degree.

PROGRAM OUTCOMES

JSU Chemistry graduates will have:

- Outcome A:** the ability to apply basic chemistry knowledge in all five modern chemistry areas to identify, formulate, and solve chemistry problems
- Outcome B:** the ability to design and conduct chemistry experiments, as well as to analyze and interpret data and results in qualitative and quantitative terms.
- Outcome C:** the broad education necessary to understand the contemporary issues and impact of the chemical sciences in global, economic, environmental, and societal contexts.
- Outcome D:** the ability to research chemistry topics, write

research reports, and give oral and poster presentations on that topic.

- Outcome E:** the foundation of chemistry knowledge to perform satisfactorily on national standardized tests including pre-professional tests.
- Outcome F:** the ability to communicate effectively through written work and oral presentations.
- Outcome G:** the ability to function on multi-disciplinary teams.
- Outcome H:** recognition of the need for, and an ability to engage in life-long learning.
- Outcome I:** the ability to apply basic knowledge of mathematics, biology and physics in situations encountered by a chemist.
- Outcome J:** the ability to appreciate new discoveries in chemical aspects of medicinal, health, environmental, and life sciences.
- Outcome K:** an understanding of professional and ethical responsibility.

REQUIREMENTS FOR THE MAJOR:**Bachelor of Science****(Certified by the American Chemical Society–124 Hrs)***

FRESHMAN YEAR		F	S
CHEM 141,142	General Chemistry I and II	3	3
CHML 141,142	General Chemistry I and II Lab	1	1
ENG 104,105	Composition	3	3
BIO 111	General Biology	3	
BIOL 111	General Biology Lab	1	
CSC 115	Digital Computer Principles		3
UNIV 100	University Success	2	
MATH 231	Calculus I with lab		4
HIST 101,102	History of Civilization	3	3
(Freshman Year Total: 33 Hrs)		16	17

SOPHOMORE YEAR		F	S
CHEM 241,242	Organic Chemistry	3	3
CHML 241,242	Organic Chemistry Lab	1	1
CHEM 243	Qualitative Org. Analysis		2
CHML 243	Qualitative Org. Analysis Lab		1
MATH 232	Calculus II with lab	4	
PHY 211,212	General Physics I and II	4	4
PHYL 211,212	General Physics I and II Lab	1	1
ENG 205	World Literature		3
PE	Physical Education Options	1	1
(Sophomore Year Total: 30 Hrs)		14	16

JUNIOR YEAR		F	S
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CHEM 320	Analytical Chemistry	3	
CHML 320	Analytical Chemistry Lab	1	
CHEM 310	Introduction Scientific Research	2	
CHEM 340	Inorganic Chemistry I	3	
CHML 340	Inorganic Chemistry Lab	1	
CHEM 341,342	Physical Chemistry	3	3
CHML 341,342	Physical Chemistry Lab [W]	1	1
CHEM 381,382	Chemistry Seminar [S]	.5	.5
MFL 101,102	Modern Foreign Language	3	3
MATH 233	Calculus III with lab	4	
SPCH	Speech Option	3	

(Junior Year Total: 32 Hrs) 15.5 16.5

SENIOR YEAR **F S**

CHEM 380	Independent Study	1	1
CHEM 421	Instrumentation		3
CHML 421	Instrumentation Lab	1	
CHEM 431	Biochemistry	3	
CHML 431	Biochemistry Lab	1	
CHEM 481,482	Chemistry Seminar [S]	.5	.5
CHEM	Advanced Chemistry Option	3	3
PHIL	Philosophy Option	3	
	Humanity/Fine Arts		3
	Social/Behavior Science	3	
	Elective		3

(Senior Year Total: 29 Hrs) 14.5 14.5

*Students are qualified to obtain a minor in biology
 *Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

Advanced Chemistry Courses: Two (2) of the following courses: CHEM 731 (Advanced Biochemistry), CHEM 736 (Physical Organic), CHEM 738 (Organic Synthesis), CHEM 741 (Advanced Inorganic Chemistry), CHEM 758 (Quantum Chemistry), ENV 701 (Environmental Chemistry).

CORE II OPTIONS: (All students must complete)

- A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, PS 334, 335, 336, GEO 105, 209, ECO 211, or 212.
- B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H..
- C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.
- D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

**Bachelor of Science in Chemistry
 Pre-Medical, Pre-Dental, Pre-Pharmacy (124 Hrs)**

FRESHMAN YEAR **F S**

CHEM 141, 142	General Chemistry	3	3
CHML 141, 142	General Chemistry Lab	1	1

ENG 104,105	Composition & Literature	3	3
BIO 111,112	General Biology	3	3
BIOL 111,112	General Biology Lab	1	1
HIST 101,102	History of Civilization	3	3
UNIV 100	University Success	2	
CSC 115	Digital Computer Principles		3

(Freshman Year Total: 33 Hrs) 16 17

SOPHOMORE YEAR **F S**

CHEM 241, 242	Organic Chemistry	3	3
CHML 241, 242	Organic Chemistry Lab	1	1
MATH 231, 232	Calculus I with Lab	4	4
BIO 234, 235	Hum. Anatomy & Physiology	3	3
BIO 234, 235	Hum. Anatomy & Physiol. Lab	1	1
SPCH	Speech Option	3	
Math 271	Elementary Statistics		3
PE	Physical Education		1

(Sophomore Year Total: 31 Hrs) 15 16

JUNIOR YEAR **F S**

CHEM 320	Analytical Chemistry	3	
CHML 320	Analytical Chemistry Lab	1	
CHEM 340	Inorganic Chemistry I		3
CHEM 340	Inorganic Chemistry I		1
CHEM 341	Physical Chemistry I	3	
CHML 341	Physical Chemistry I Lab [W]	1	
CHEM 381, 382	Chemistry Seminar [S]	.5	.5
PHY 201,202	Basic Physics	3	3
PHYL 201,202	Basic Physics Lab	1	1
MFL 101,102	Foreign Language	3	3
CHEM 380	Independent Study	1	
Eng 205	Literature		3
PE	Physical Education		1

(Junior Year Total: 32 Hrs) 16.5 15.5

SENIOR YEAR **F S**

CHEM 431, 432	Biochemistry	3	3
CHML 431	Biochemistry Lab	1	
BIO 313	Microbiology	3	
BIOL 313	Microbiology Lab	1	
CHEM 380	Independent Study		1
CHEM 481, 482	Chemistry Seminar [S]	.5	.5
CHEM	Chemistry Option	3	3
	Social/Behavior Science	3	
	Humanity/Fine Arts		3
PHIL	Philosophy Option		3

(Senior Year Total: 28 Hrs) 14.5 13.5

*Students are qualified to obtain a minor in biology

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*Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

Chemistry Options: At least two (2) of the following:
 CHEM 342 (Physical Chemistry II), CHEM 421 (Instrumentation), CHEM 441 (Inorganic Chemistry II), BIO 218, 318, 440, 441, and 470, Immunology.

CORE II OPTIONS: (All students must complete)

- A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, PS 334, 335, 336, GEO 105, 209, ECO 211, or 212.
- B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H.
- C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.
- D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

**Bachelor of Science in Chemistry
 Biomedical Science Concentration (123 hrs)**

FRESHMAN YEAR	F	S
CHEM 141, 142 General Chemistry	3	3
CHML 141, 142 General Chemistry Lab	1	1
ENG 104, 105 Composition & Literature	3	3
BIO 111, 112 General Biology	3	3
BIOL 111, 112 General Biology Lab	1	1
HIST 101, 102 History of Civilization	3	3
UNIV 100 University Success	2	
CSC 115 Digital Computer Principles		3
(Freshman Year Total: 33 Hrs)	16	17

SOPHOMORE YEAR	F	S
CHEM 241, 242 Organic Chemistry	3	3
CHML 241, 242 Organic Chemistry Lab	1	1
CHEM 243 Qual. Organic Analysis		2
CHML 243 Qual. Organic Analysis Lab		1
MATH 231,232 Calculus I & II with lab	4	4
SPCH Speech Option	3	
ENG 205 World Literature	3	
MFL 101,102 Language	3	3
PE xxx Physical Education		1
(Sophomore Year Total: 32 Hrs)	17	15

JUNIOR YEAR	F	S
CHEM 320 Analytical Chemistry	3	
CHML 320 Analytical Chemistry Lab	1	
CHEM 341 Physical Chemistry	3	
CHML 341 Physical Chemistry Lab [W]	1	
PHY 201, 202 Basic Physics	3	3
PHY 201, 202 Basic Physics Lab	1	1
CHEM 381, 382 Chemistry Seminar [S]	.5	.5

CHEM 340 Inorganic Chemistry I	3	
CHML 340 Inorganic Chemistry I Lab	1	
CHEM 310 Introduction to Research	2	
CHEM 380 Independent Study	1	
PE xxx Physical Education	1	
BIO Biomed Option + Lab		4
(Junior Year Total: 29 Hrs)	13.5	15.5

SENIOR YEAR	F	S
CHEM 421 Instrumentation		3
CHML 421 Instrumentation Lab		1
CHEM 431, 432 Biochemistry	3	3
CHML 431 Biochemistry Lab	1	
CHEM 380 Independent Study	1	1
CHEM 481, 482 Chemistry Seminar [S]	.5	.5
PHIL Philosophy Option		3
BIO Biomed Option	3	
Social & Behavioral Sciences	3	
Humanities and Fine Arts		3
Elective	3	
(Senior Year Total: 29 Hrs)	14.5	14.5

*Students are qualified to obtain a minor in biology
 *Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

Biomedical Science Option (Two of the following, one of which must have lab): BIO 234 (Human Anatomy & Physiology), BIO 313 (Intro Microbiology), BIO 318 (Intro Genetics), BIO 440 (Cell Biology), BIO 409 (General Genetics).

CORE II OPTIONS: (All students must complete)

- A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, PS 334, 335, 336, GEO 105, 209, ECO 211, or 212.
- B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H..
- C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.
- D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

**Bachelor of Science in Chemistry
 Forensic Science Concentration (124 Hrs)**

FRESHMAN YEAR	F	S
CHEM 141, 142 General Chemistry	3	3
CHEM 141, 142 General Chemistry Lab	1	1
BIO 111, 112 General Biology	3	3
BIOL 111, 112 General Biology Lab	1	1
HIST 101, 102 History Civilization	3	3
ENG 104, 105 Composition & Literature	3	3
UNIV 100 University Success	2	
CSC 115 Digital Computer Principles		3

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(Freshman Year Total: 33 Hrs) 16 17

SOPHOMORE YEAR F S

CHEM 241, 242	Organic Chemistry	3	3
CHML 241, 242	Organic Chemistry Lab	1	1
MATH 231, 232	Calculus I & II with Lab	4	4
MATH 271	Elementary Statistics		3
SPCH	Speech Option	3	
ENG 205	World Literature		3
PE	Physical Education Option	1	1
	Humanities and Fine Arts	3	

(Sophomore Year Total: 30 Hrs) 15 15

JUNIOR YEAR F S

CHEM 320	Analytical Chemistry	3	
CHML 320	Analytical Chemistry Lab	1	
CHEM 340	Inorganic Chemistry I		3
CHML 340	Inorganic Chemistry I Lab		1
PHY 201, 202	Basic Physics	3	3
PHY 201, 202	Basic Physics Lab	1	1
MFL 101, 102	Modern Foreign Language	3	3
CHEM 381, 382	Chemistry Seminar	.5	.5
CHEM 371	Forensic Chemistry		3
CHML 371	Forensic Chemistry Lab		1
BIO	Microbiology	3	

(Junior Year Total: 30 Hrs) 14.5 15.5

SENIOR YEAR F S

CHEM 341	Physical Chemistry	3	
CHML 341	Physical Chemistry Lab [W]	1	
CHEM 421	Instrumentation		3
CHML 421	Instrumentation Lab		1
CHEM 431	Biochemistry I	3	
CHML 431	Biochemistry I Lab	1	
CHEM 471	Forensic Toxicology		3
CHEM 475	Forensic Practicum		3
CHEM 481,482	Chemistry Seminar [S]	.5	.5
PHIL xxx	Philosophy Option		3
CJ 324	Intro. Criminal Justice	3	
CJ 443	Found. Crim. Investigation		3
	Social & Behavioral Sciences	3	

(Senior Year Total: 31 Hrs) 14.5 16.5

*Students are qualified to obtain a minor in biology
 *Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

CORE II OPTIONS: (All students must complete)

A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, PS 334, 335, 336, GEO 105, 209, ECO 211, or 212.

B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H..

C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.

D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

**Bachelor of Science in Chemistry
 Environmental Sciences Concentration (124 Hrs)**

FRESHMAN YEAR F S

CHEM 141, 142	General Chemistry	3	3
CHML 141, 142	General Chemistry Lab	1	1
ENG 104, 105	Composition & Literature	3	3
BIO 111, 112	General Biology	3	3
BIOL 111, 112	General Biology Lab	1	1
HIST 101, 102	History of Civilization	3	3
UNIV 100	University Success	2	
CSC 115	Digital Computer Principles		3

(Freshman Year Total: 33 Hrs) 16 17

SOPHOMORE YEAR F S

CHEM 241, 242	Organic Chemistry	3	3
CHML 241, 242	Organic Chemistry Lab	1	1
MATH 231,232	Calculus I & II with Lab	4	4
PHIL xxx	Philosophy Option		3
SPCH xxx	Speech Option	3	
ENG 205	Literature	3	
PE xxx	Physical Education	1	1
	Social & Behavioral Sciences		3

(Sophomore Year Total: 30 Hrs) 15 15

JUNIOR YEAR F S

CHEM 310	Introduction to Research		2
CHEM 320	Analytical Chemistry	3	
CHML 320	Analytical Chemistry Lab	1	
CHEM 340	Inorganic Chemistry I		3
CHML 340	Inorganic Chemistry I Lab		1
CHEM 341	Physical Chemistry	3	
CHML 341	Physical Chemistry Lab[W]	1	
CHEM 380	Independent Study		1
CHEM 381, 382	Chemistry Seminar [S]	.5	.5
PHY 201, 202	Basic	3	3
PHYL 201, 202	Basic Physics Lab	1	1
MFL 101, 102	Modern Foreign Language	3	3

(Junior Year Total: 30 Hrs) 15.5 14.5

SENIOR YEAR F S

CHEM 421	Instrumentation		3
CHML 421	Instrumentation Lab		1
CHEM 431	Biochemistry	3	

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CHML 431	Biochemistry Lab	1	
CHEM 481, 482	Chemistry Seminar [S]	.5	.5
CHEM 410	Environmental Chemistry	3	
CHML 410	Environmental Chem. Lab	1	
CHEM 380	Independent Study	1	
BIO	ENV Option + Lab		4
BIO	ENV Option + Lab		4
	Toxicology Option		3
	Elective	3	
	Humanities and Fine Arts	3	
(Senior Year Total: 31 Hours)		15.5	15.5

*Students are qualified to obtain a minor in biology
 *Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

Environmental Science Options (two of the following): BIO 201 & BIOL 201 (Introduction to Environmental Sciences); BIO 403 & BIOL 403 (Human Environments and Natural Systems); BIO 404 & BIOL 404 (Introduction to Environmental Science);
 Toxicology Option: CHEM 471 (Forensic Toxicology), ITHM 400 (Principle of Toxicology), ITHM 529 (Environmental Toxicology and Risk Assessment).

CORE II OPTIONS: (All students must complete)

- A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, PS 334, 335, 336, GEO 105, 209, ECO 211, or 212.
- B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H..
- C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.
- D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

**Bachelor of Science in Chemistry
 Without ACS Certification (124 Hrs)**

FRESHMAN YEAR		F	S
CHEM 141, 142	General Chemistry	3	3
CHML 141,142	General Chemistry Lab	1	1
ENG 104,105	Composition	3	3
MATH xxx	Mathematics Options	3	3
BIO 111	General Biology	3	
BIOL 111	General Biology Lab	1	
UNIV 100	University Success	2	
CSC 115	Digital Computer Principles		3
	Humanities and Fine Arts		3
(Freshman Year Total: 32 Hrs)		16	16

SOPHOMORE YEAR

CHEM 241, 242	Organic Chemistry	3	3
CHML 241,242	Organic Chemistry Lab	1	1
MATH 231,232	Calculus I & II with Lab	4	4
HIST 101,102	History of Civilization	3	3

ENG 205	Literature	3	
CHEM 243	Qual. Organic Analysis		2
CHML 243	Qual. Organic Analysis Lab		1
PE xxx	Physical Education Option	1	1
(Sophomore Year Total: 30 Hrs)		15	15

JUNIOR YEAR

		F	S
CHEM 320	Analytical Chemistry	3	
CHML 320	Analytical Chemistry Lab	1	
CHEM 340	Inorganic Chemistry I		3
CHML 340	Inorganic Chemistry I Lab		1
CHEM 381, 382	Chemistry Seminar [S]	.5	.5
PHY 201,202	Basics Physics	3	3
PHYL 201,202	Basic Physics	1	1
MFL 101,102	Modern Foreign Language	3	3
SPCH	Speech Option	3	
PHIL xxx	Philosophy Option		3
(Junior Year Total: 29 Hrs)		14.5	14.5

SENIOR YEAR

		F	S
CHEM 341	Physical Chemistry	3	
CHML 341	Physical Chemistry Lab[W]	1	
CHEM 421	Instrumentation		3
CHML 421	Instrumentation Lab		1
CHEM 481, 482	Chemistry Seminar	.5	.5
CHEM xxx	Chemistry Option	3	3
	Electives	6	9
	Social & Behavioral Sciences	3	
(Senior Year Total: 33 Hrs)		16.5	16.5

*Other Requirements: Standardized Test (GRE, MCAT, MFT, etc.), Research Report, and Research Presentation

Chemistry Options: At least one (1) of the following courses: CHEM 342 (Physical Chemistry), CHEM 431 (Biochemistry), CHEM 441(Inorganic Chemistry II)

Math Options: Two of the following : MATH 111, MATH 112, or MATH 118, MATH 232, MATH 233. If taking MATH 118, there will be one less credit hour needed for the student to graduate. If a student is qualified to take MATH 231 in the freshman year, MATH 111, 112, or 118 are not required, rather, the student can take MATH 232, MATH 233, or other elective courses as options.

CORE II OPTIONS: (All students must complete)

- A. Social/Behavioral Science: SS 201, 202, SOC 214, 325, 335, 336, GEO 105, 209, ECO 211, or 212.
- B. Fine Arts/Humanities: ART 206, DR 201, MUS 205, ENG, 201H, or 202H..
- C. Speech Options: SPCH 201, 216, 300, 334, 335, or 430.

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D. Philosophy Options: PHIL 301, 308, 309, or 416, MGMT 482, SW 210.

If the student also wants a B.S. Degree in Chemistry from Jackson State University, courses equivalent to the following must be completed at the collaborating School of Engineering or during a Jackson State Summer Session.

Speech Option 3.0
Social/Behavioral Science Option 6.0

**Bachelor of Science in Chemistry
Pre-Chemical Engineering (101 Hrs)**

FRESHMAN YEAR	F	S
CHEM 141, 142 General Chemistry I and II	3	3
CHML 141, 142 General Chemistry I and II Lab	1	1
ENG 104,105 Composition	3	3
MATH 231, 232 Calculus I & II with Lab	4	4
BIO 111 General Biology	3	
BIOL 111 General Biology Lab	1	
CSC 115 Digital Computer Principles		3
UNIV 100 University Success	2	
PE 100 Physical Education		1
(Freshman Year Total: 33 Hrs)	<u>17</u>	<u>15</u>

SOPHOMORE YEAR	F	S
CHEM 241, 242 Organic Chemistry	3	3
CHML 241, 242 Organic Chemistry Lab	1	1
PHY 211,212 General Physics I and II	4	4
PHYL 211,212 General Physics I and II Lab	1	1
MATH 233 Calculus III with Lab	4	
CHEM 243 Qual. Organic Analysis		2
CHML 243 Qual. Organic Analysis Lab		1
ENG 205 World Literature		3
PE xxx Physical Education Course	1	
Humanities & Fine Arts	3	
MATH 368 Differential Equations I		3
(Sophomore Year Total: 35 Hrs)	<u>17</u>	<u>18</u>

JUNIOR YEAR		
CHEM 341, 342 Physical Chemistry	3	3
CHML 341, 342 Physical Chemistry Lab [W]	1	1
CHEM 320 Analytical Chemistry	3	
CHML 320 Analytical Chemistry Lab	1	
CHEM 453 Thermodynamics		3
CHEM 381, 382 Chemistry Seminar [S]	.5	.5
HIST 101,102 History of Civilization	3	3
MFL 101,102 Modern Foreign Language	3	3
PHIL Philosophy	3	
Social & Behavioral Sciences		3
(Junior Year Total: 34 Hrs)	<u>17.5</u>	<u>16.5</u>

SENIOR YEAR