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THE UNIVERSITY of WISCONSIN MADISON

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Welcome to All 72 New Chemistry Grad Students!

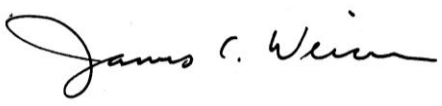
The Chemistry Department is a *great* place to teach and to learn and to grow intellectually; it is also a warm and welcoming place. I've been a faculty member here for some 29 years. I just became Chair of the Department on July 1, so both you and I are on the steepest part of a learning curve. You are a large and talented group who have come from all over the U.S. and the world to earn a Ph.D. at one of the strongest Chemistry Departments in the country. Our strength relies not only on our faculty and staff, but also on the outstanding grad students who continually drive the research forward with their talent, motivation, creativity, and hard work. Cutting-edge science is developing all around you in this Department, and we are very pleased you will be joining us in these efforts.

Over the next few weeks, you will be inundated with information and challenged by coursework and teaching and seminars. So I wanted to take this opportunity to emphasize that the Ph.D. in Chemistry is a *research* degree. You have many tasks to do well in Fall semester, but *your most important job is to find the right research group!* There will be information sessions, social events, and advising events to help you figure out what "right" means and make a wise decision. *Please go out of your way to talk in depth with faculty and grad students about their research.* This is not a burden on anyone—we all *love* to talk about our research and we welcome your questions! And keep an open mind. You may find yourself *absolutely fascinated* by a problem you know nothing about today. *Follow your instincts.*

Beginning this year, we have six "paths" leading to the Ph.D. in Chemistry: Analytical Sciences, Chemical Biology (new this year), Inorganic Chemistry, Materials Chemistry, Organic Chemistry, and Physical Chemistry. When you applied here for grad school, you checked a preference box at the top of a form to select one of these six. But that was before you traveled extensively and learned a lot more about modern chemistry. *Now we begin again.* You should choose your path based on your strongest current research interests and attend the corresponding advising session. *Importantly, you can follow any path while working towards the Ph.D. with any research advisor.* The accompanying information sheets give a broad description of each research area, a timeline of events for the first three years, and a list of faculty officially affiliated with each path. The paths differ somewhat in the details, but all six are designed to help you develop into an excellent research scientist with outstanding communication skills.

Let me close by saying that I consider it a privilege to be allowed to make a living by teaching and doing research; few people are so lucky. You stand at the threshold of a great intellectual adventure. I can guarantee trials and tribulations, but if you persist and work hard and *think*, you can experience the thrill that comes from solving a problem for the first time or making a discovery that is uniquely yours. I wish you every success in the exciting years to come.

With best regards,



James C. Weisshaar

Analytical Sciences Path

The Analytical Sciences Research Program focuses on developing new methods of chemical measurement based on fundamental chemical and physical principles and applying these new technologies to the solution of important scientific problems. The range of measurement technologies covers linear and nonlinear spectroscopy, mass spectrometry, surface and interface spectroscopy, chromatography, and electrochemistry. The analytical science faculty apply these new technologies to a wide range of problem areas including chemical analysis, proteomics, genomics, biochemistry, materials chemistry, surface science, nanotechnology, environmental chemistry, atmospheric science, energy technologies, catalysis, and polymer science. Students in the program develop strong experimental and problem solving skills and the fundamental physical and chemical insights required to become leaders in the industrial, academic, and research communities.

Three-year Timeline:

	FALL	**SPRING**	
Year 1	Coursework (see below). **By Nov. 15:** *Research group selection*	Coursework *Research*	
Year 2	Coursework *Research*	Complete coursework *Research*	**By end of spring:** Oral & written prelim defense
Year 3	*Research*	*Research*	**End of May:** Original RP, Oral & Written defense Dissertator status achieved

Path Features:

1. Coursework*. First-year students should attend Chem 901 ("How to Be a Grad Student").* The required courses for the Analytical Path are Chem 621, Chem 607 (the Laboratory Safety course), and any two of the following: Chem 622, Chem 623, Chem 624, Chem 625, Chem 628, and Chem 630. Additional coursework requirements are flexible, with students taking at least 10 credits of additional coursework to fulfill the minor requirement. Coursework should be completed by the end of Year 2.

2. Seminars. *All students should attend the Analytical-Materials Seminar (Chem 920) every semester.*

3. Second-Year Preliminary Examination on thesis project. This will consist of a written document and a talk describing research plans and progress to date plus an oral defense of the proposed thesis project. This Preliminary Exam will occur by the end of Spring semester in the second year.

4. Third-year Original Research Proposal. The topic should be outside the student's primary research area. This component will consist of a written proposal in the style of the NSF, followed by a seminar presentation and oral defense of the proposal before the Mentoring Committee.

5. Regular meetings with the Mentoring Committee. Each student will select a Mentoring Committee of three faculty members (research advisor plus two more) by the end their first year. At least one of the committee members must be a member of the Analytical Sciences Division. Meetings will be held as follows: (i) Preliminary Examination (2nd year), (ii) Original Research Proposal (3rd year), (iii) Thesis Planning Meeting (about 1 year prior to anticipated defense), and (iv) Thesis Defense.

Contact persons. *Chair:* ***Prof. John Wright****. Administrative support:* ***Ms. Sue Martin-Zernicke.***

Faculty affiliated with the Analytical Sciences Path: Coon, Hamers, Jin, Keutsch, Li, Mahanthappa, Schwartz, Smith, Weisshaar, Wright.

Chemical Biology Path

Many research groups in the Chemistry Department interweave ideas from chemistry and biology to solve important problems. Our faculty are helping to define this evolving approach to science, and UW-Madison is one of the strongest centers for chemical biology research in the world. This research is exceptionally broad in scope, extending from the design and synthesis of organic compounds that bind and modulate the function of specific biological targets, to the spectroscopic study of proteins and DNA, to the construction and use of high density DNA arrays for data storage and retrieval, to the development of new polymeric vehicles for drug delivery. In general, research groups are either synthesizing compounds and materials with novel biological activities, developing new experimental and spectroscopic techniques to characterize biomolecules and biological phenomena, or combining both of these approaches.

Three-year Timeline:

<table>
<tr><th></th><th colspan="2">FALL</th><th colspan="2">SPRING</th></tr>
<tr><td>Year 1</td><td colspan="2">Three Desk Rotations. Coursework.
By Nov. 15: Research group selection</td><td colspan="2">Coursework.
Research</td></tr>
<tr><td>Year 2</td><td>Coursework (TBD)
Research</td><td>End of Jan: Oral & Written Prelim defense</td><td colspan="2">Coursework (TBD)
Research</td></tr>
<tr><td>Year 3</td><td colspan="2">Research</td><td>Research</td><td>End of May: Original RP, Oral & Written defense
Dissertator status achieved</td></tr>
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Path Features:

1. Coursework*. First-year students should attend Chem 901 ("How to Be a Grad Student") and Chem 607 (Safety).* The path has only two required courses. In Fall of Year 1: *Chemical Biology (Biochem 704)*. In Spring of Year 1: *Biophysical & Bioanalytical Methods (Chem 860).* All other coursework is flexible and tailored to the student's research interests. Students must take at least 10 credits of coursework in addition to the two required courses. This will fulfill the minor requirement. Students will take at least one seminar course of their own choosing (counting toward the 10 credits) and present a talk within this course. Coursework typically will be completed by the end of Year 2.

2. Biological Seminars by Outside Faculty. Students will be strongly encouraged to attend pertinent seminars inside and outside of the Department by visiting faculty.

3. Second-Year Preliminary Examination on thesis project. This includes a written document and a talk describing research plans and progress to date, plus an oral defense of the proposed thesis project before the Mentoring Committee. This Preliminary Exam will occur by the end of January of the second year.

4. Third-year Original Research Proposal. This component will consist of an oral and written defense of an original research proposal outside the student's primary research area.

5. Regular meetings with the Mentoring Committee. Each student will select a Mentoring Committee of three faculty members (research advisor plus two more) by the end their first year. Meetings will be held as follows: (i) Preliminary Examination (2nd year), (ii) Original Research Proposal (3rd year), (iii) Thesis Planning Meeting (about 1 year prior to anticipated defense), and (iv) Thesis Defense.

Contact persons. *Chair:* ***Prof. Helen Blackwell****.*
Administrative support: ***Ms. Kristi Heming*** *and* ***Ms. Kathleen Myhre.***

Faculty affiliated with the Chemical Biology Path: Blackwell, Brunold, Burstyn, Cavagnero, Coon, Cui, Gellman, Hamers, Jin, Kiessling, Li, Lynn, Mecozzi, Raines, Record, Schwartz, Shen, Skinner, Smith, Strieter, Weisshaar, Yethiraj, and Zanni.

Inorganic Chemistry Path

Research in Inorganic Chemistry covers the breadth of the periodic table and emphasizes the role of the elements in catalysis, biology, materials chemistry and energy applications. Research groups in this area focus on synthetic, physical and theoretical aspect of inorganic chemistry; organometallic chemistry, including synthetic and mechanistic studies and its application to catalysis; bioinorganic chemistry, including spectroscopic, computational and mechanistic studies of metalloenzymes; and synthetic and computational studies of solid-state and materials chemistry.

Three-year Timeline:

	FALL	**SPRING**	
Year 1	Three 3-wk Rotations. Coursework (see below). Cumulative exams (see below). **By Nov. 15:** *Research group selection*	Coursework. Cumulative exams. *Research*	
Year 2	Coursework/cumes, if needed. *Research*	Coursework/cumes, if needed. *Research*	**End of Year 2:** Written research report.
Year 3	*Research* Defense of research report. Present inorganic literature seminar.	*Research*	**Before April 1:** Original written RP plus oral defense. Dissertator status achieved.

Path Features:

1. Coursework*. First-year students should attend Chem 901 ("How to Be a Grad Student") and Chem 607 (Safety).* The required courses for the Inorganic Path are two physical inorganic classes (Chem 608 and one of Chem 606, 613, or 801) plus two descriptive inorganic classes (Chem 713 and one of Chem 714, 801, or 630). Additional coursework requirements are flexible, but must fulfill the minor requirement. Coursework should be completed by the end of Year 2.

2. Cumulative Exams. These are a series of written exams on announced topics (3x/semester) intended to reinforce knowledge of the primary literature and content not covered in coursework. You receive a grade of 2, 1 or 0 pts. You must accumulate 9 points to complete the cumes, and this should occur before the end of year two.

3. Second-Year Thesis Research Report. This consists of a written document describing research plans and progress to date as well as your vision of future plans. Due on Sept. 1 at the end of the second year.

4. Third-Year Meeting with Mentoring Committee. Within two months of submission of the written research report, you will present a talk on your research report and discuss the plan with your Mentoring Committee.

5. Literature Seminar. After completion of cumes, you will present a regular Inorganic Seminar reviewing the literature in an inorganic topic of your choice.

6. ***Third-year Original Research Proposal.*** Before April 1 of the third year, you will submit a 10-page, written proposal in the style of an NIH proposal. The topic should be outside the student's primary research area and unrelated to ongoing research in the Chemistry Department. When your proposal is deemed acceptable, you will then defend it before your Mentoring Committee.

7. Regular meetings with the Mentoring Committee. A Mentoring Committee of three faculty members (research advisor plus two more) is assigned by the end the first year. Meetings will be held as follows: (i) Evaluation of 2nd yr Research Report (Fall, Yr 2), (ii) Research Proposal Defense (Spr. Yr 3), (iii) Thesis Planning Meeting (if needed, end of Yr 5), and (iv) Thesis Defense.

Contact persons. *Chair:* ***Prof. Thomas Brunold****. Administrative support:* ***Ms. Kristi Heming.***

Faculty affiliated with the Inorganic Chemistry Path: Berry, Brunold, Burstyn, Fredrickson, Jin, Landis, Mahanthappa, Stahl, and Yoon.

Materials Chemistry Path

Materials Chemistry is concerned with the preparation, characterization, and understanding of substances and systems that have useful function. The subjects of interest can be inorganic materials, polymer/organic materials, or biomaterials. They can be bulk, nanoscale, or surface/interfacial materials. Ongoing research in the materials chemistry program emphasizes fundamental synthesis-structure-property relationships and develops important applications in renewable energy (solar energy conversion, fuel cells, thermoelectrics, energy storage), nanotechnology, electronics, biotechnology, and biomedicine.

Three-year Timeline:

	FALL	**SPRING**	
Year 1	Coursework (see below). **By Nov. 15:** *Research group selection*	Coursework *Research*	
Year 2	Coursework *Research*	Complete coursework *Research*	**By end of spring:** Oral & written prelim defense (TBO)
Year 3	*Research*	*Research*	**End of May:** Original RP, Oral & Written defense Dissertator status achieved

Path Features:

1. ***Coursework****. First-year students should attend Chem 901 ("How to Be a Grad Student") and Chem 607 (Safety).* Three graduate level courses are required. Students must take at least one course from the Inorganic Materials "track" (Chem 630) and one course from the Soft Materials track (Chem 654, 664, or 842). The third course must be a graduate materials course approved by the Program Chair. Additional coursework is flexible, but must fulfill the minor requirement. Coursework should be completed by the end of Year 2.

2. ***Seminars.*** *All students should attend the Materials Chemistry (which shares the time slot with Analytical) Seminar (Chem 920) every semester.*

3. Second-Year Preliminary Examination on thesis project. This will consist of a written document and a talk describing research plans and progress to date plus an oral defense of the proposed thesis project. This Thesis Background Oral will occur by the end of Spring semester in the second year.

4. ***Third-year Original Research Proposal.*** The topic should be outside the student's primary research area. This component will consist of a written proposal in the style of the NSF, followed by a seminar presentation and oral defense of the proposal before the Mentoring Committee.

5. Regular meetings with the Mentoring Committee.

Each student will select a Mentoring Committee of three faculty members (research advisor plus two more) by the end their first year. At least one of the committee members must be a member of the Materials Chemistry Program. Meetings will be held as follows: (i) Preliminary Examination (2nd year), (ii) Original Research Proposal (3rd year), (iii) Thesis Planning Meeting (about 1 year prior to anticipated defense), and (iv) Thesis Defense.

Contact persons. *Chair:* ***Prof. Song Jin****. Administrative support:* ***Ms. Sue Martin-Zernicke.***

Faculty affiliated with the Materials Chemistry Path: Ediger, Fredrickson, Gellman, Gopalan, Hamers, Jin, Kiessling, Mahanthappa, McMahon, Schmidt, Smith, Wright, Yethiraj, and Yu (Lian).

Organic Chemistry Path

As a graduate student majoring in organic chemistry, you can expect to participate in one of the strongest organic programs in the world. Our approach to graduate education is to combine well organized academics (courses, seminars, proposal) with world class research. The goal of the organic program is to give the Ph.D. student the most modern background in preparation for an independent career. You will have an unusually large number of top-flight research groups to choose from for your dissertation studies. All organic research areas of current interest, including synthetic, mechanistic, bioorganic, organometallic, combinatorial, materials, catalytic, structural, and computational chemistry are represented, usually by multiple research groups. With such an extensive selection available, you should be readily able to match your interests and goals to an appropriate research advisor.

Three-year Timeline:

	FALL	**SPRING**	
Year 1	Three or Four 3-week Rotations. Coursework (see below). **By Nov. 15:** *Research group selection*	Coursework. *Research*	
Year 2	Coursework as needed. Seminar (fall or spring) *Research*	Coursework as needed. *Research*	**End of Year 2:** Written research report.
Year 3	Discuss research report with mentoring committee. *Research*	*Research*	**Due Dec. or April:** Original written RP plus oral defense. Dissertator status achieved.

Path Features:

1. Coursework*. First-year students should attend Chem 901 ("How to Be a Grad Student") and Chem 607 (Safety).* The required courses for the Organic Path are Chem 641, 841, and 843. Nearly all students also take Chem 636 and Chem 605. Additional coursework requirements are flexible, but must fulfill the minor requirement. Coursework should be completed as early as possible (Year 1 or Year 2).

2. Seminars. All organic students should attend all Organic Chemistry Seminars (Chem 940) unless their teaching schedule interferes.

3. Literature Seminar. By the end of the second year, you will present a regular Organic Chemistry Seminar, reviewing the literature on an organic chemistry topic of your choice.

4. Second-Year Thesis Research Report. This consists of a written document describing research plans and progress to date as well as your vision of future plans. Due on Sept. 1 at the end of the second year. you will present a talk on your research and discuss the plan with your Mentoring Committee.

5. Third-year Original Research Proposal. You will submit a 5-page proposal written in the style of an NIH proposal. The topic should be outside the student's primary research area and unrelated to ongoing research in the Chemistry Department. There are two deadlines, one in December and one in April. When your proposal is deemed acceptable, you will defend it before your Mentoring Committee.

6. Regular meetings with the Mentoring Committee. The mentoring committee is assigned during the second year of graduate work. The committee meets with the student for the second-year research review, the third-year research proposal, prior to the student entering the 6th year of graduate work (if needed) and the final thesis defense.

Contact persons. *Chair:* ***Prof. Robert McMahon****. Administrative support:* ***Ms. Kathleen Myhre.***

Faculty affiliated with the Organic Chemistry Path: Berry, Blackwell, Burke, Cavagnero, Gellman, Hsung, Gopalan, Kiessling, Landis, Lynn, Mahanthappa, McMahon, Mecozzi, Nelsen, Raines, Record, Reich, Schomaker, Stahl, Strieter, Yoon, and Zimmerman.

Physical Chemistry Path

Physical chemistry explores the "how" and "why" behind chemical phenomena. Research in our division uses experiment, simulation, and theory to understand fundamental aspects of chemical bonding, molecular structure, and the kinetics of transformations. Particular attention is being given to biological structures, nanostructures, surfaces, liquids, and crystalline and amorphous solids. Many of these research projects are relevant for energy production and for biological, atmospheric, and materials chemistry.

Three-year Timeline:

	FALL	**SPRING**	
Year 1	Coursework (see below). **By Nov. 15:** *Research group selection*	Coursework, including Chem 960 (2 credits). *Research*	
Year 2	Coursework Two Literature Topic Exams *Research*	Coursework Thesis Background Oral Exam *Research*	
Year 3	*Research* Coursework as needed.	*Research*	**By End of Year 3:** Original Research Proposal (Oral & Written defense). Dissertator status achieved

Path Features:

1. ***Coursework****. First-year students should attend Chem 901 ("How to Be a Grad Student") and Chem 607 (Safety).* In Fall of Year 1, all students should take Chem 661 and Chem 675. In Spring, they should take the "seminar course", Chem 960, for two credits. A total of ten credits of graduate coursework in physical chemistry are required (typically one course in addition to Chem 661, 675, and 960). Additional coursework is flexible, but must fulfill the minor requirement.

2. Seminars. *All students should attend the Physical Chemistry Seminar (Chem 960) every semester.*

3. Second-Year Literature Topic Exams. A research paper from the current literature will be handed out ten days in advance of the three-hour written exam. This occurs twice in the Fall semester of Year 2.

4. Thesis Background Oral Exam. In Spring semester of Year 2, students will submit a 1-2 page written summary describing your planned thesis research. This includes goals, techniques, and background, plus results if any. You will then meet with your Mentoring Committee to present your plan orally and answer questions.

5. Third-year Original Research Proposal. The topic should not be closely related to the student's primary research area. This component will consist of a written proposal followed by an open oral presentation followed by questions from the audience and then questions from your Mentoring Committee.

6. Regular meetings with the Mentoring Committee. Mentoring Committee of three faculty members (research advisor plus two more) will be selected in the second year. Meetings will be held as follows: (i) Thesis Background Oral Exam (2nd year), (ii) Original Research Proposal (3rd year), (iii) Fourth year Mentor Committee Meeting, and (iv) Thesis Defense.

Contact persons. *Chair:* ***Prof. Mark Ediger****. Administrative support:* ***Ms. Pat Houtsinger.***

Faculty affiliated with the Physical Chemistry Path: Cavagnero, Crim, Cui, Ediger, Hamers, Jin, Keutsch, Mahanthappa, Nathanson, Record, Schmidt, Sibert, Skinner, Weisshaar, Woods, Wright, Yethiraj, Yu (Lian), and Zanni.