Graduate School Demystified
Ken Hanson
FSU Department of Chemistry & Biochemistry
Graduate School Demystified: Outline

1) Application timeline
2) Deciding where to apply
3) The application/admission process
4) Graduate school timeline
5) Graduate school summary
6) After your Ph.D.
Applying for Graduate School in Chemistry

**Dec 1-15:** Application Deadlines
- Transcript
- CV/Resume
- 3 letters of rec
- Cover letter
- GRE (some schools)

**Late Dec-Feb:** Admissions

**Feb and Mar:** Visitation Weekends

**April 15th:** Decision Deadline

**Early August:** Start Date
Where to Apply?

• Location

• Salary

• Department

• Resources

• Research
Where to Apply?

• Location
  - Weather
  - Proximity to home
  - Hobbies
  - Life experience

(Note that grad school is temporary!)
Where to Apply?

• Salary
  Base Pay: $19,000-$40,000
  Average: $26,500 (C&EN 2022)
  FSU: $30,073

Other factors:
  Tuition, fees, health insurance, guaranteed support

Cost of living (https://www.nerdwallet.com/cost-of-living-calculator)
Where to Apply?

• Department Size

FSU Chemistry:
- 33 research active faculty
- ~160 graduate students
- ~40 postdoctoral fellows

https://www.acs.org/education/students/graduate/survey-of-phd-programs-in-chemistry.html
Where to Apply?

- Department Size
- Research Strengths

Chemistry of Energy & Materials
  - Advanced Measurement & Analysis
  - Physical Analytical Biochemistry

Chemistry of Health
  - Biochemistry
    - Organic, Physical
  - Inorganic, Organic Physical, Materials

Biochemistry
  - Organic, Physical
Where to Apply?

• Department
  Size
  Research Strengths
  Collegiality
  Social/Networking
  Success rates
  Graduate Student Union
Where to Apply?

- Department Size
- Research Strengths
- Collegiality
- Social/Networking
- Success rates
- Graduate Student Union
- Collaborative vs. Competitive
Where to Apply?

- Department Size
- Research Strengths
- Collegiality
- Social/Networking
- Success rates
- Graduate Student Union
- Collaborative vs. Competitive
- Ranking
Where to Apply?

• Resources
  - Equipment
  - Access
  - Support staff
  - Repairs
• **NMR Lab:** Solid-State and Solution NMR 700, 600, 2 x 500, 400 and 2 x 300 MHz
• **MaC Lab:** AFM, DSC, TGA, SQUID, BET
• **Mass Spec Lab:** TOF, MALDI, GC, ICP, LC
• **X-Ray Lab:** 3 x powder, 2 x Crystal, Fluorescence
• **Spectroscopy Lab:** SS and TR spectroscopy, quantum yield, Raman/IR
• **Glass Blower, Machine, and Electrical Shop**
Where to Apply?

• Research

Find at least two faculty that you would be excited to work with!
Where to Apply?

• Location
• Salary
• Department
• Resources
• Research
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Applying for Graduate School in Chemistry

Dec 1-15: Application Deadline

• Transcript
  Lower-level vs. upper-level GPA
  Check for minimum GPA

• CV/Resume
  Highlight research experience
  Publications

• 3 letters of rec
  Ideally people that know you well
  From research advisor

• Cover letter
  Faculty/research interests
  Address any shortcoming in your app

• GRE (some schools)
  Less and less common
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Applying for Graduate School in Chemistry

**Late Dec-Feb: Admissions**

- Graduate Admissions Committee (6 members)

Then you get an unofficial admissions email and/or phone call!
Applying for Graduate School in Chemistry

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Applying for Graduate School in Chemistry

Feb and Mar: Visitation Weekend

General Goals:

Experience the town/university.

Get a feel for the department culture.

Get your questions answered.

Research goal is to find:

1) someone you want to work for.

2) a group you want to work with.

3) project/goal alignment.

4) something you would like to do on a daily basis.

The University of Florida
Department of Chemistry & Biochemistry

Thursday, February 9

10:00AM - 6:00PM Hotel Check-in: Aloft Tallahassee Downtown

Roommate: N/A

200 North Monroe Street

6:00PM Pick up from the Hotel lobby (Current Graduate Student: Jason Kosmynski)

7:00PM Dinner with Current Graduate Students (Railroad Square Crafthouse)

Friday, February 10

7:40AM Transport from Aloft to the Chemistry Department (meet in the Hotel Lobby)

8:00AM - 8:40AM Breakfast and Chemistry Department Welcome (CLS 1005)

Dr. Kenneth Hanson and Dr. Wei Yang

8:45AM - 9:15AM Meetings with Faculty – Graduate Student Escort: Rachel Clark

9:15AM - 9:30AM Dr. Blou Me (CLC 214)

10:00AM - 10:15AM Coffee / Snack Break (CLS 1005)

10:15AM - 11:00AM Facilities/Lab Tour: Staff

10:15AM - 10:30AM 10:40AM - 10:00AM

11:00AM - 11:45AM Meeting with Faculty – Graduate Student Escort: Rachel Clark

11:10 - 11:40 Dr. Le Novians (CLS 4001)

11:45AM - 1:00PM Informative Lunch (student life, curriculum, and money matters – CLS 1005)

1:15PM - 1:30PM Drive to MagLab (Current Graduate Student: Folando Gonzalez)

1:30PM - 2:00PM Tour of National High Magnetic Field Laboratory with Dr. Marshall

2:30PM - 2:50PM Drive back to Department (Current Graduate Student: Folando Gonzalez)

3:00PM - 4:10PM Meeting with Faculty – Graduate Student Escort: Rachel Clark

3:00PM - 3:30 PM Dr. Kenneth Hanson (CLS 5006)

3:40 - 4:10 PM Dr. Yen-Yen Hu (CLS 2004)

4:15PM - 4:30PM C & A with Dr. Kenneth Hanson (CLS 1001)

4:45PM - 5:00PM Campus Tour

5:00PM - 6:15PM Poster Session at Miller Hall

6:30PM - 8:00PM Dinner with Faculty at Miller Hall

8:15PM Arrive Aloft

9:00PM Optional: Night out with Current Grad Students

Saturday, February 11

10:00AM Transport from Aloft to The Rez (meet in the Hotel Lobby)

10:30AM - 12:30PM Branch at The Rez

12:30PM Shuttle to Airport
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Early August: Start Date
April 15th: Decision Deadline

“Students are under no obligation to respond to offers of financial support prior to April 15”

“[If a person accepts on offer but wants to change] the applicant must first inform the program that they are withdrawing or resigning from...Once they have informed the program that they are withdrawing, they then can accept any other offers.”
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Early August: Start Date
Ph.D at FSU: Timeline

1\textsuperscript{st} weeks  Orientation
1\textsuperscript{st} Year  5 Classes
1\textsuperscript{st} Sem.  Lab Exploration and Choosing an Advisor
1\textsuperscript{st} Year  Teaching Assistant
2\textsuperscript{nd} Year  Research Presentation
3\textsuperscript{rd} Year  Ph.D. candidacy exam
4\textsuperscript{th} Year  Data Defense
4\textsuperscript{th}-6\textsuperscript{th} Year  Thesis and Defense (average 5.2 years)
Ph.D at FSU: Timeline

1st weeks Orientation

- Intake paperwork
- Safety Training
- TA Training
- Teaching Tips
- Faculty Research Presentations
- and more...
Ph.D at FSU: Timeline

1st Year  5 Classes (2 or 3 per semester)

**Analytical Chemistry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CHM 5140</td>
<td>Introduction to Chemical Instrumentation</td>
</tr>
<tr>
<td>CHM 5119</td>
<td>Mass Spectrometry</td>
</tr>
<tr>
<td>CHM 5151</td>
<td>Optical Methods of Chemical Analysis</td>
</tr>
<tr>
<td>CHM 5153</td>
<td>Electrochemistry</td>
</tr>
<tr>
<td>CHM 5154</td>
<td>Chemical Separations</td>
</tr>
</tbody>
</table>

**Area Core Knowledge Courses**

**Special Topic Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CHM 5160</td>
<td>Special Topic in Analytical Chemistry</td>
</tr>
<tr>
<td>CHM 5454</td>
<td>Polymer Characterization (co-listed in Materials)</td>
</tr>
<tr>
<td>CHM 5715</td>
<td>Characterization of Materials: NMR</td>
</tr>
<tr>
<td>CHM 5086</td>
<td>Environmental Chemistry</td>
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</tbody>
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**Biochemistry**

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<tbody>
<tr>
<td>BCH 5405</td>
<td>Molecular Biology</td>
</tr>
<tr>
<td>BCH 5505</td>
<td>Structure and Function of Enzymes</td>
</tr>
<tr>
<td>BCH 5745</td>
<td>Chemical and Physical Characterization of Biopolymers</td>
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<tr>
<td>BCH 5884</td>
<td>Programming for Chemists and Biochemists</td>
</tr>
<tr>
<td>BCH 5806</td>
<td>Special Topic: Biomolecular Nuclear Magnetic Resonance</td>
</tr>
<tr>
<td>BCH 5887</td>
<td>Special Topic: Drug Target and Assay Development</td>
</tr>
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**Inorganic Chemistry**

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<tbody>
<tr>
<td>CHM 5620</td>
<td>Principles of Physical Chemistry</td>
</tr>
<tr>
<td>CHM 5640</td>
<td>Group Theory I</td>
</tr>
<tr>
<td>CHM 5629</td>
<td>Solid State Chemistry</td>
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<tr>
<td>CHM 5881</td>
<td>Physical Methods in Inorganic Chemistry</td>
</tr>
<tr>
<td>CHM 5442</td>
<td>Advanced Inorganic Chemistry for Emerging Applications</td>
</tr>
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**Materiale Chemistry**

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<tr>
<td>CHM 5715</td>
<td>Chemistry of Materials: cross-listed as CHM 4714</td>
</tr>
<tr>
<td>CHM 5450</td>
<td>Polymer Chemistry: cross-listed as CHM 4655</td>
</tr>
<tr>
<td>CHM 5454</td>
<td>Polymer Characterization</td>
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<td>CHM 5629</td>
<td>Solid State Chemistry</td>
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**Special Topic Courses**

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<tr>
<td>CHM 5716</td>
<td>Characterization of Materials: NMR</td>
</tr>
<tr>
<td>CHM 5718</td>
<td>Topics in Materials Chemistry II: Magnetism and Magnetic Materials</td>
</tr>
<tr>
<td>CHM 5712</td>
<td>Nanomaterials</td>
</tr>
<tr>
<td>CHM 5880</td>
<td>Nuclear Magnetic Resonance Spectroscopy</td>
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**Organic Chemistry**

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<tbody>
<tr>
<td>CHM 5226</td>
<td>Advanced Organic Chemistry: Reactions and Mechanisms</td>
</tr>
<tr>
<td>CHM 5245</td>
<td>Physical Organic Chemistry</td>
</tr>
<tr>
<td>CHM 5250</td>
<td>Advanced Organic Synthesis</td>
</tr>
<tr>
<td>CHM 5225</td>
<td>Advanced Organic Chemistry: Characterizations</td>
</tr>
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**Special Topic Courses**

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<tr>
<td>CHM 5380</td>
<td>Special Topic: Heterocycles</td>
</tr>
<tr>
<td>CHM 5380</td>
<td>Photochemistry and Photophysics</td>
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**Physical Chemistry**

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<tr>
<td>CHM 5481</td>
<td>Advanced Quantum Mechanics</td>
</tr>
<tr>
<td>CHM 5506</td>
<td>Physical Chemistry of Macromolecules</td>
</tr>
<tr>
<td>CHM 5580</td>
<td>Nuclear Magnetic Resonance Spectroscopy</td>
</tr>
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After completing 5 classes, research focused!
1st Sem.  Lab Exploration and Choosing an Advisor

**Ph.D at FSU: Timeline**

**1st Sem. Lab Exploration and Choosing an Advisor**

**Phase 1)** Meet with at least 3 faculty members. (by end of Sept.)

**Phase 2)** Do 2 or 3 lab explorations. (by end of Oct.)

**Phase 3)** Group selection. (by start of Nov.)
**Ph.D at FSU: Timeline**

**1st Year Teaching Assistant**

**Laboratory TA**
Monitor 2-3 labs per week. Office hours + lab grading.

**Recitation TA**
3 x 1 hour classroom periods. Office hours + exam grading.
Ph.D at FSU: Timeline

2nd Year Research Presentation

Area seminar (open to all)

20-minute presentation

5-10 minutes for questions

Introduction to your research.

Some preliminary results.
Ph.D at FSU: Timeline

3rd Year (Fall) Ph.D. candidacy exam

Candidacy Exam (only committee members):
1) Written Component (i.e., Research Proposal)
   • <12 pages
   • style of an NSF or NIH R01 proposal
   • aims, rationale, background, preliminary data, and future work

2) Oral Component (~90 min. presentation; then questions)
   (a) Defense of research proposal (30-40 min.)
   (b) Defense of fundamental knowledge in chemistry

After you pass, you are officially a Ph.D. candidate!
(and receive your M.S. if you want it)
Ph.D at FSU: Timeline

4th Year Data Defense

“The Data Defense will demonstrate to the Ph.D. committee that the Ph.D. candidate has collected sufficient data of adequate quality to assemble the dissertation.”

Area seminar (open to all)
40-50 minute presentation
10-20 minutes for questions
Ph.D at FSU: Timeline
4\textsuperscript{th}-6\textsuperscript{th} Year Thesis and Defense (average 5.2 years)

Defense:
Open, 50 min presentation
10 min. for \textit{?} from audience
30-60 min. \textit{?} from the committee

Thesis/Dissertation:
A compilation of your graduate research
Highlights a unique contribution to science
Typically, 100-300 pages
Ph.D at FSU: Timeline

1st weeks Orientation
1st Year 5 Classes
1st Sem. Lab Exploration and Choosing an Advisor
1st Year Teaching Assistant
2nd Year Research Presentation
3rd Year Ph.D. candidacy exam
4th Year Data Defense
4th-6th Year Thesis and Defense (average 5.2 years)
The Illustrated Guide to a Ph.D.

Imagine a circle that contains all of human knowledge:

A master's degree deepens that specialty:

Reading research papers takes you to the edge of human knowledge:

Until one day, the boundary gives way:

And, that dent you've made is called a Ph.D.:

Of course, the world looks different to you now:

So, don't forget the bigger picture:

Keep pushing.

Matthew Might, University of Utah
Ph.D at FSU: Afterwards

Industry

AstraZeneca, Hercules, Vertex Pharmaceuticals, Amgen, Applied Biosystems, ThermoFinnigan, Nanostream, Ashland Chemical, PE Biosystems, Hoffman La Roche, General Dynamics, Bruker, DuPont CR&D, Merck, Pfizer, Johnson & Johnson, Waters, Rhône-Poulenc, Abbott Labs, Eli Lilly, Varian NMR Inc. ...

Government

Scripps Fla., Batelle Pacific Northwest Nat’l Labs, NHMFL, Wright-Patterson AFB ...

Academia:

MIT, U. of Michigan, U. of Minnesota, UC Irvine, U. of Maine, École Polytechnique, Albert Einstein College of Medicine, Cornell University, Georgia State, Univ. at Alabama at Huntsville, Univ. of Maryland ...

Postdoctoral positions:

MIT, Cambridge, Caltech, Northwestern, NIH, ...
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1) Application timeline
2) Deciding where to apply
3) The application/admission process
4) Graduate school timeline
5) Pushing the boundaries of knowledge
6) After your Ph.D.

Questions?