# School of MCB Undergraduate Research Information Session


Tina M. Knox,
Assistant Director for Advising and Recruitment
February 1, 2023

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# Agenda

- Special information for biochemistry students
- What is undergraduate research?
- How to find a lab
- How to enroll in MCB 290/BIOC 290
- Faculty perspective
- Student perspective
- Graduation with Distinction, if time

# Biochemistry Majors Only

- BIOC 290, independent laboratory research
- BIOC 492, senior thesis
- Contact Jeff Goldberg for template email to use – not necessary to use student profile.
- Paper forms signed by Jeff Goldberg, flexible deadlines
- Need 6 hrs of senior research for distinction in biochem
- Email Jeff for additional information, **jmgoldbe@illinois.edu, Room 417 RAL**

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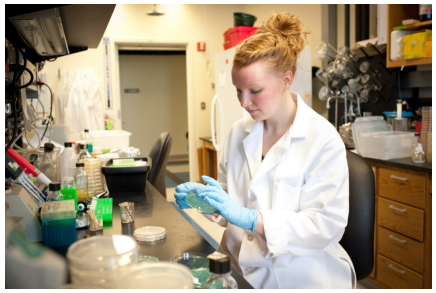
# What Is Undergraduate Research?

- A mentored investigation conducted by undergraduates that seeks to make a scholarly contribution to knowledge.
- Original work performed under the direction of a UIUC faculty member (P.I.), post-doc or graduate student.
- Earn course credit (MCB 290 or BIOC 290)
  - ➢ Earn a grade for their contributions to the lab
- Some paid positions exist (Campus Job Board)
  - ➢ Cannot earn money if earning credit



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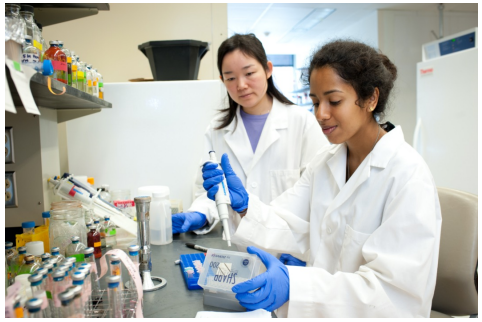

# Why Research?

- Enrich your educational experience
- Make connections with faculty
- Develop skills in analytical thinking, **communication** and **teamwork**
- Determine if graduate studies may be a viable post-graduate goal

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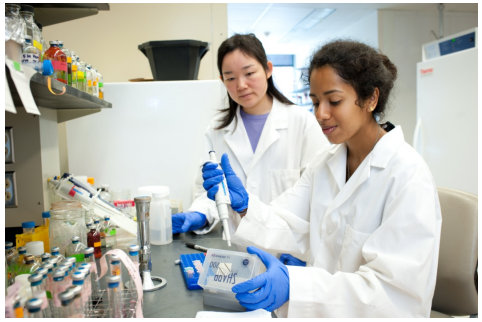

# Why Research?

- Gain intensive practical knowledge using modern technology
- Explore issues and methods in your field of interest
- Build confidence
- Practice **problem solving**

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# Eligibility for MCB 290/BIOC 290

- Must be a *declared* major in Biology, MCB, MCB Honors, Neuroscience, or Biochemistry
- Conduct research in an *approved* laboratory at UIUC
  - Neuroscience students choose from https://mcb.illinois.edu/research/areas/neuroscience
- Good academic standing, recommended GPA of 2.75 or higher
- Cannot receive monetary payment, or any other form of academic credit, based on the research for which MCB 290 or BIOC 290 credit is earned.
- Must enroll in the course by the university deadline to add a semester course using the appropriate forms.

https://mcb.illinois.edu/academics/undergraduate-programs/undergraduate-research

# Typical Workload

- 1 credit MCB/BIOC 290 = approximately 5 hrs/week in lab/over a 16-week term (8-week summer sessions, 1 credit = 10 hrs/week)

- Keep in mind this is an average.  You need to plan to stay until your work is done. Each lab will have own policies.

- Make sure you have a clear understanding of the faculty expectations for credit and *how your grade will be assessed*.

# Expectations

- Show dedication to the project. This should be a priority.
- Read primary research articles
- May need to come in at odd hours, including nights and weekends.
- May be expected to attend lab meetings.
- May be expected to present your data.
- May be expected to write a senior thesis.

# Limits ?

- A limit of 10 credit hours of MCB 290/BIOC 290 can be applied towards the 120 hours needed for graduation

- However, you are encouraged to continue your research for as many terms as you wish.

- All MCB 290/BIOC 290 semesters and the assigned letter grades will appear on your transcript and count in your GPA.

# How to Find a Lab

1. Determine when you want to start and how long you can commit; then plan your course/work schedule accordingly.
2. Review information on SMCB websites, talk with TAs and faculty in your classes
3. Read about faculty and their research interests
4. Make a list of faculty with whom you want to work
5. Create an online student profile (bioc students use Jeff's email template)
6. Contact faculty via email: Be professional and concise; follow up, if necessary


### As an undergraduate student researcher

You will gain hands-on experience using state-of-the-art technology, following scientific procedures, and honing your analytical and communications skills. Such experiences also often help inform decisions on pursuing postgraduate education. Undergraduate researchers are eligible to earn course credit for their work.

**Quick links**

MCB 290 Request/Renewal | MCB 492 Request/Renewal | Student Profile Database | Biochemistry Majors | Graduation with Distinction | Undergraduate Research Symposium | Funding

# How to Find a Lab

## Review information on MCB websites

- Finding a research lab
- Eligibility and obtaining credit via MCB 290 and MCB 492 forms
- Determining work load
- Applying for a summer research fellowship (SURF)
- Submitting a senior thesis (optional)

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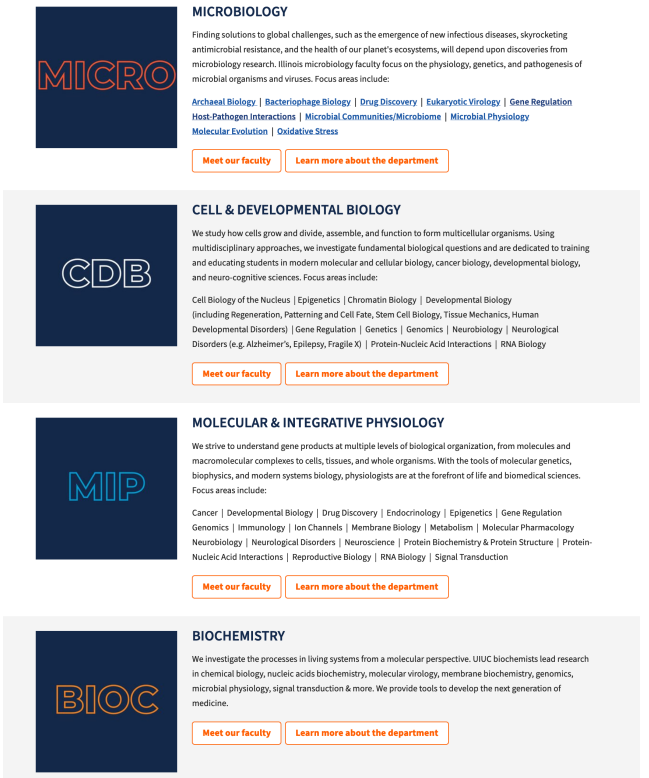
# How to Find a Lab

Read about faculty research interests in MCB and beyond

- https://mcb.illinois.edu/research
- Google UIUC _____ research
- https://experts.illinois.edu/

Make a list of faculty you want to contact



MICRO

**MICROBIOLOGY**

Finding solutions to global challenges, such as the emergence of new infectious diseases, skyrocketing antimicrobial resistance, and the health of our planet's ecosystems, will depend upon discoveries from microbiology research. Illinois microbiology faculty focus on the physiology, genetics, and pathogenesis of microbial organisms and viruses. Focus areas include:

Archaeal Biology | Bacteriophage Biology | Drug Discovery | Eukaryotic Virology | Gene Regulation Host-Pathogen Interactions | Microbial Communities/Microbiome | Microbial Physiology Molecular Evolution | Oxidative Stress

Meet our faculty | Learn more about the department

CDB

**CELL & DEVELOPMENTAL BIOLOGY**

We study how cells grow and divide, assemble, and function to form multicellular organisms. Using multidisciplinary approaches, we investigate fundamental biological questions and are dedicated to training and educating students in modern molecular and cellular biology, cancer biology, developmental biology, and neuro-cognitive sciences. Focus areas include:

Cell Biology of the Nucleus | Epigenetics | Chromatin Biology | Developmental Biology (including Regeneration, Patterning and Cell Fate, Stem Cell Biology, Tissue Mechanics, Human Developmental Disorders) | Gene Regulation | Genetics | Genomics | Neurobiology | Neurological Disorders (e.g. Alzheimer's, Epilepsy, Fragile X) | Protein-Nucleic Acid Interactions | RNA Biology

Meet our faculty | Learn more about the department

MIP

**MOLECULAR & INTEGRATIVE PHYSIOLOGY**

We strive to understand gene products at multiple levels of biological organization, from molecules and macromolecular complexes to cells, tissues, and whole organisms. With the tools of molecular genetics, biophysics, and modern systems biology, physiologists are at the forefront of life and biomedical sciences. Focus areas include:

Cancer | Developmental Biology | Drug Discovery | Endocrinology | Epigenetics | Gene Regulation Genomics | Immunology | Ion Channels | Membrane Biology | Metabolism | Molecular Pharmacology Neurobiology | Neurological Disorders | Neuroscience | Protein Biochemistry & Protein Structure | Protein-Nucleic Acid Interactions | Reproductive Biology | RNA Biology | Signal Transduction

Meet our faculty | Learn more about the department

BIOC

**BIOCHEMISTRY**

We investigate the processes in living systems from a molecular perspective. UIUC biochemists lead research in chemical biology, nucleic acids biochemistry, molecular virology, membrane biochemistry, genomics, microbial physiology, signal transduction & more. We provide tools to develop the next generation of medicine.

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# Faculty Profile

## Supriya Prasanth

**Professor and Head of Department of Cell & Developmental Biology**

Prasanth Lab page

## Contact Information

Department of Cell and Developmental Biology
University of Illinois at Urbana-Champaign
C422 Chemical and Life Sciences Laboratory
601 S. Goodwin Avenue
Urbana, IL 61801

(217) 244-8076
supriyap@illinois.edu

## Research Areas

Cancer
Chromatin Biology
Protein-Nucleic Acid Interactions

## Research Interests

**Research Topics**

Chromatin Structure, DNA Biology, Protein-Nucleic Acid Interactions

**Disease Research Interests**

Cancer

## Research Description

**Eukaryotic DNA replication; Chromosome structure & maintenance; Heterochromatin organization; Cell cycle control**

The initiation of DNA replication in eukaryotic cells is a highly regulated process that leads to the duplication of genetic information for the next cell generation. DNA replication, which occurs during S phase of the cell cycle, is intimately linked to mitotic progression and eventually cell division. Inaccurate DNA replication in turns leads to abnormal chromosome segregation resulting in aneuploidy and genomic instability, a hallmark of most cancerous cells. Thus the accurate duplication of DNA is of paramount importance and is governed by a number of proteins including the Origin Recognition complex (ORC) which serves as a landing pad for the assembly of a multiprotein pre-replicative complex. Other than its bonafide role in DNA replication, ORC proteins are involved in diverse functions including gene silencing, heterochromatin organization, cytokinesis and also in dendrite formation in postmitotic neurons. The focal point of research in my lab is to study the events and uncover the cues that integrate DNA replication with heterochromatin organization, chromosome segregation and cytokinesis, major focus being on the role of ORC in interconnecting these events.

**The research project includes:**

**Role of ORC proteins in heterochromatin organization and chromosome structure**

## Highlighted Publications

Rosaline Y.C. Hsu, Yo-Chuen Lin, Christophe Redon, Qinyu Sun, Deepak K. Singh, Yating Wang, Yasmina Aggarwal, Jaba Mitra, Abhijith Matur, Branden [illegible] Taekjip Ha, Mirit I Aladjem, Kannanganattu V. Prasanth and Supriya G. Prasanth (2020) ORCA/LRWD1 regulates homologous recombination at ALT-telomeres by modulating heterochromatin organization. *iScience*, April 17: https://doi.org/10.1016/j.isci.2020.101038

Yo-Chuen Lin+, Yating Wang+, Rosaline Hsu, Sumanprava Giri, Susan Wopat, Mariam K. Arif, Arindam Chakraborty, Kannanganattu V. Prasanth, and Supriya G. Prasanth*: PCNA-mediated stabilization of E3 ligase RFWD3 at the replication fork is essential for DNA replication. *PNAS (USA)* 2018 Dec 10. pii: 201814521. doi: 10.1073/pnas.1814521115. [Epub ahead of print]

Wang Y, Khan A, Marks AB, Smith OK, Giri S, Lin YC, Creager R, MacAlpine DM, Prasanth KV, Aladjem MI, Prasanth SG. (2017). Tempral association of ORCA/LRWD1 to late-firing origins during G1 dictates heterochromatin replication and organization. *Nucleic Acids Res*, pii: gkw1211. PMCID: PMC5389698

Sumanprava Giri, Arindam Chakraborty, Kizhakke M. Sathyan K, Kannanganattu V. Prasanth and Supriya G. Prasanth (2016).Orc5 induces large-scale chromatin decondensation in a GCN5-dependent manner. *J. Cell Sci.*, Jan 15;129(2):417-29.

Abid Khan, Sumanprava Giri, Yating Wang, Arindam Chakraborty, Archit K Ghosh, Aparna Anantharaman, Vasudha Aggarwal, Kizhakke M Sathyan, Taekjip Ha, Kannanganattu V Prasanth and Supriya G Prasanth (2015). BEND3 represses rDNA transcription by stabilizing a NoRC component via USP21 deubiquitinase. *PNAS*(USA), Jul 7;112(27):8338-43. doi: 10.1073/pnas.1424705112.

Sumanprava Giri, Vasudha Aggarwal, Julien Pontis, Zhen Shen, Arindam Chakraborty, Abid Khan, Craig Mizzen, Kannanganattu V. Prasanth, Slimane Ait-Si-Ali, Taekjip Ha and Supriya G. Prasanth (2015). The preRC protein ORCA organizes heterochromatin by assembliing histone H3 lysine 9 methyltransferases on chromatin. *eLIFE* Apr 29. 10.7554/eLife.06496

Arindam Chakraborty, Kannanganattu V. Prasanth and Supriya G. Prasanth (2014). Dynamic phosphorylation of HP1a regulates mitotic progression in human cells. *Nature Communications*. DOI: 10.1038/ncomms4445.

Shen Z, Chakraborty A, Jain A, Giri S, Ha T, Prasanth KV and Supriya G. Prasanth (2012). Dynamic association of ORCA with preRC components regulates DNA replication initiation. *Mol Cell Biol*. 32(15): 3107-3120.

Zhen Shen, Kizhakke M. Sathyan, Yijie Geng, Ruiping Zheng, Arindam Chakraborty, Brian Freeman, Fei Wang, Kannanganattu V. Prasanth and Supriya G. Prasanth (2010) A novel WD-repeat protein stabilizes ORC binding to chromatin. *Molecular Cell*2010 Oct. 4; 40(1): 99-111 (PMID: 20932478).

Supriya G. Prasanth*, Zhen Shen, Kannanganattu V. Prasanth and Bruce Stillman* (2010). Human ORC is essential for HP1 binding to chromatin and for heterochromatin organization. *PNAS*, Aug 24;107(34):15093-8. Epub 2010 Aug 5. (* first and co-corresponding author) [FULL TEXT PDF]

Adriana Hemerly, Supriya G. Prasanth, Khalid Siddiqui and Bruce Stillman (2009). Orc1 Controls Centriole and Centrosome Copy Number in Human Cells. *Science*, Feb 6, 323: 789-793. [FULL TEXT PDF]

Supriya G. Prasanth, Kannanganattu V. Prasanth, Khalid Siddiqui, David L. Spector and Bruce Stillman (2004). Human Orc2 localizes to centrosomes, centromeres and heterochromatin during chromosome inheritance. *EMBO J.* Jul 7;23(13):2651-6.

Supriya Gangadharan Prasanth, Kannanganattu V. Prasanth and Bruce Stillman (2002). Orc6 involved in DNA replication, chromosome segregation and cytokinesis. *Science* 297(5583): 1026-1031.

## Recent Publications

Kurniawan, F., & Prasanth, S. G. (2022). A BEN-domain protein and polycomb complex work coordinately to regulate transcription. *Transcription*, *13*(1-3), 82-87. https://doi.org/10.1080/21541264.2022.2105128

Kurniawan, F., Chetlangia, N., Kamran, M., Redon, C. E., Pongor, L., Sun, Q., Lin, Y. C., Mohan, V., Shaqildi, O., Asoudegi, D., Hao, Q., Khan, A., Aladjem, M. I., Prasanth, K. V., & Prasanth, S. G. (2022). BEND3 safeguards pluripotency by repressing differentiation-associated genes. *Proceedings of the National Academy of Sciences*, *119*(9), [e2107406119]. https://doi.org/10.1073/pnas.2107406119

Lin, Y. C., Liu, D., Chakraborty, A., Kadyrova, L. Y., Song, Y. J., Hao, Q., Mitra, J., Hsu, R. Y. C., Arif, M. K., Adusumilli, S., Liao, T. W., Ha, T., Kadyrov, F. A., Prasanth, K. V., & Prasanth, S. G. (2022). Orc6 is a component of the replication fork and enables efficient mismatch repair. *Proceedings of the National Academy of Sciences of the United States of America*, *119*(22), [e2121406119]. https://doi.org/10.1073/pnas.2121406119

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# How to Find a Lab

Create an online Student Profile

## Using the MCB 290 Student Profile Database

If you plan to contact MCB professors during your search for a research position, we recommend that you submit an electronic resume to the MCB 290 Student Profile Database. Your on-line resume may be completed at any time and will remain active in the database for six months. During your search, this allows you to provide uniform information to all MCB professors whose research is of interest to you. Non-MCB faculty will not have access to this database, so you will need to send them your information in a Word document. Questions regarding the MCB 290 Profile Database can be directed to mcb290help@life.illinois.edu.

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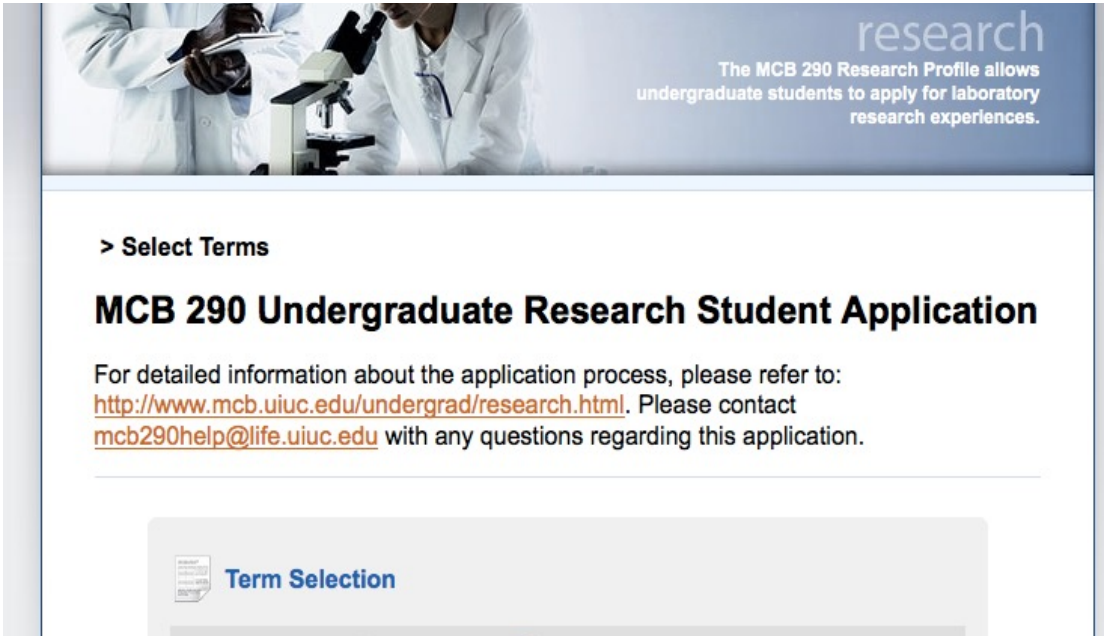
# Student Profile Database

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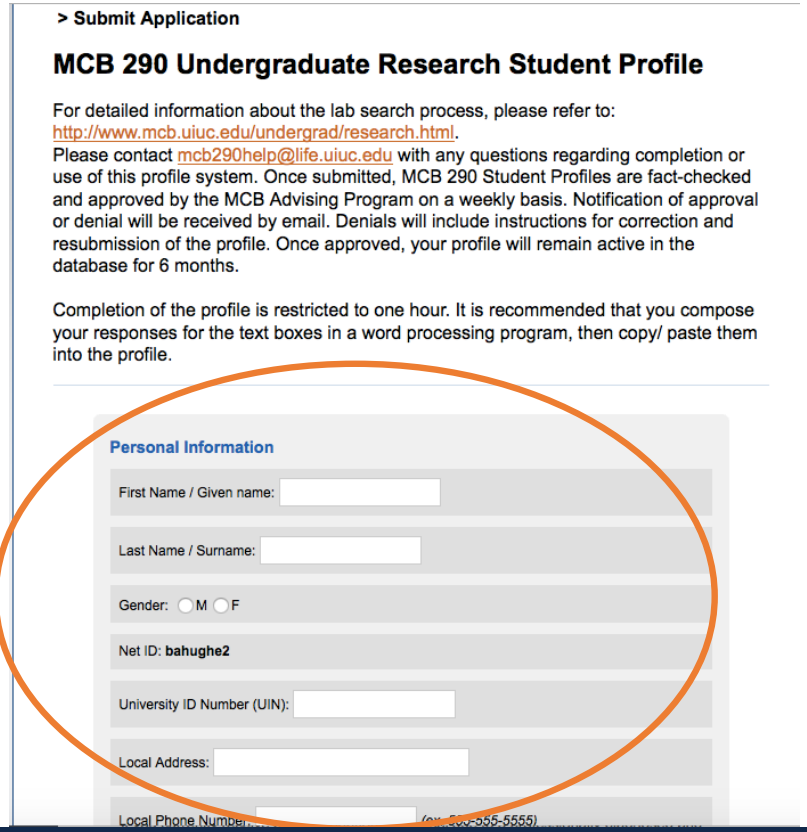


> Submit Application

## MCB 290 Undergraduate Research Student Profile

For detailed information about the lab search process, please refer to: http://www.mcb.uiuc.edu/undergrad/research.html.
Please contact mcb290help@life.uiuc.edu with any questions regarding completion or use of this profile system. Once submitted, MCB 290 Student Profiles are fact-checked and approved by the MCB Advising Program on a weekly basis. Notification of approval or denial will be received by email. Denials will include instructions for correction and resubmission of the profile. Once approved, your profile will remain active in the database for 6 months.

Completion of the profile is restricted to one hour. It is recommended that you compose your responses for the text boxes in a word processing program, then copy/ paste them into the profile.

**Personal Information**

First Name / Given name:

Last Name / Surname:

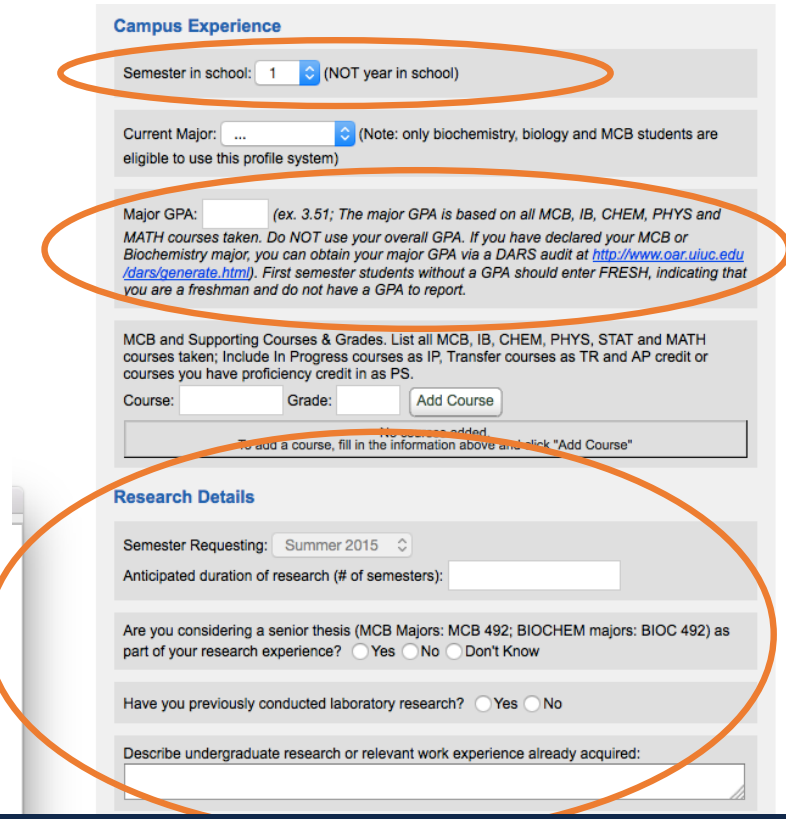
Gender: M F

Net ID: **bahughe2**

University ID Number (UIN):

Local Address:

Local Phone Number



**Campus Experience**

Semester in school: 1 (NOT year in school)

Current Major: ... (Note: only biochemistry, biology and MCB students are eligible to use this profile system)

Major GPA: *(ex. 3.51; The major GPA is based on all MCB, IB, CHEM, PHYS and MATH courses taken. Do NOT use your overall GPA. If you have declared your MCB or Biochemistry major, you can obtain your major GPA via a DARS audit at http://www.oar.uiuc.edu/dars/generate.html). First semester students without a GPA should enter FRESH, indicating that you are a freshman and do not have a GPA to report.*

MCB and Supporting Courses & Grades. List all MCB, IB, CHEM, PHYS, STAT and MATH courses taken; Include In Progress courses as IP, Transfer courses as TR and AP credit or courses you have proficiency credit in as PS.

Course: Grade: Add Course

No courses added
To add a course, fill in the information above and click "Add Course"

**Research Details**

Semester Requesting: Summer 2015

Anticipated duration of research (# of semesters):

Are you considering a senior thesis (MCB Majors: MCB 492; BIOCHEM majors: BIOC 492) as part of your research experience? Yes No Don't Know

Have you previously conducted laboratory research? Yes No

Describe undergraduate research or relevant work experience already acquired:

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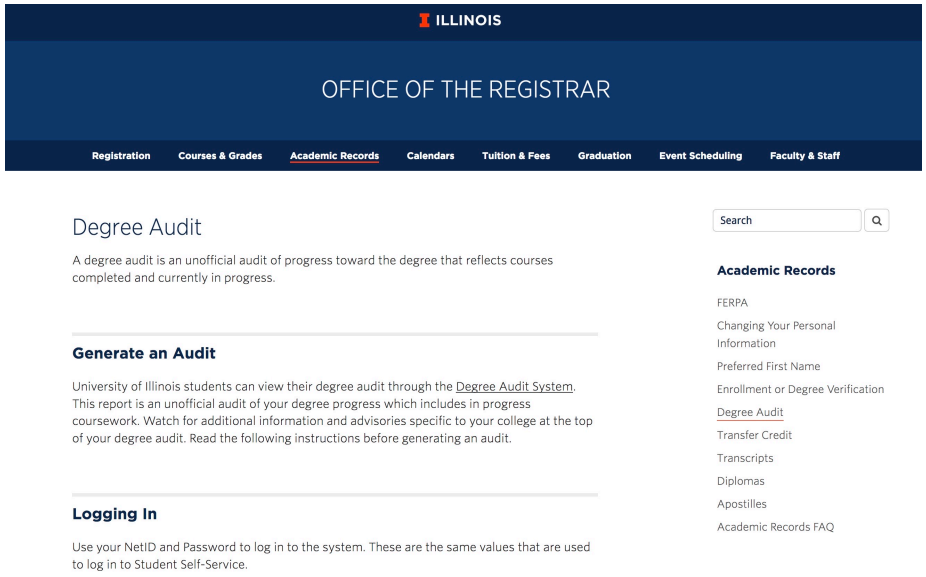
# Finding your Major GPA

- Run a Degree Audit for your major
- Scroll down to find “Major GPA Requirement”





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# Student Profile Database

- Profile information is checked for accuracy by MCB Advising, typically takes ~1 week for processing.
- Upon approval, you will receive an **email with a link** to your profile that you can send to MCB faculty.
- Profile is only active for 6 months, then must update
- *Only available to MCB/BIOC/NEUR students*
- *Only viewable by MCB/BIOC/NEUR faculty*

# How to Find a Lab

Contact Faculty

- ✓ Send introductory email – preferred method
- ✓ Be professional (use greeting and signature)
- ✓ Be specific to each lab – why are you interested in their research?
- ✓ Be patient and persistent
  - May have to send a follow up email
  - Wait at least 5 days between emails
- ✓ Work in batches, contact 5 or 6 labs at a time

# How to Find a Lab

## Template for Introductory email

Dear Dr. Anakk,

My name is Tina Knox. I'm a sophomore in MCB and am very interested in undergraduate research as I'm considering graduate school in the future. In looking at your research website, I see that you study liver metabolism. I've learned a bit about metabolic pathways in my MCB classes and would love to get a deeper understanding of how they relate to disease in the body. Do you have space for an undergraduate in your lab next spring?

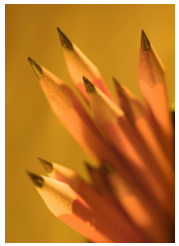
I've linked to my student profile here, *studentprofilelink*. If you need any additional information, let me know. I hope to hear from you soon about opportunities in your lab.

Thanks for your consideration,

Tina Knox

# Interview Tips

- Casual dress, but professional
- Come prepared to talk generally about lab projects and why you are interested
- Ask about expectations!!!!
  - When/how often are you expected to be in lab?
  - How will your grade be determined?
- Be honest about your availability
  - Academics should come first?
- Send a brief thank you email



# How to Enroll in MCB 290

- Fill out online form before add deadline.
- Note if this is an official MCB lab or Non-MCB lab
- Note if this is a first request or renewal
- Need netid of PI – not grad student or post-doc
  - For Non-MCB labs, attach 1 page research proposal

**Quick links**

MCB 290 Request/Renewal | MCB 492 Request/Renewal | Student Profile Database

Graduation with Distinction | Undergraduate Research Symposium | Funding

Official List of MCB Faculty as of November 2022

School of MCB Affiliate Faculty List as of November 2022

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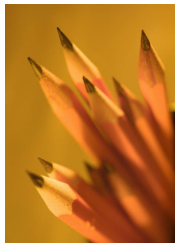

# How to Enroll in MCB 290

- You will receive a notification email confirming the form has been submitted.
- Automatically sent to PI for approval.
- After PI approves, automatically sent to MCB for approval.
- Once approved, you will receive email from MCB290@mcb.Illinois.edu with the CRN to register.
- **You must register for the class on your own before the deadline! Will default to one credit hour.**

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# MCB 290 Deadlines

- 10th day of fall/spring semester at 5:00 PM
- 7th day of summer session II at 5:00 PM
- Must renew every semester by the deadline using online form.

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# Non-MCB Labs to Consider

| | |
|---|---|
| Integrative Biology | Chemistry |
| Psychology<br>Neuroscience program | Kinesiology |
| Bioengineering<br>Physics | Veterinary Medicine<br>Pathobiology<br>Comparative Biosciences |
| Crop Sciences | Animal Sciences |
| Beckman Institute | Institute for Genomic Biology (IGB) |

# Safety

Before beginning research, your PI should ask you to complete safety training specific to your lab.

- Wear appropriate Personal Protective Equipment (PPE) or other protective equipment as required by your lab or other research setting.

- Take online lab safety training through the Division of Research Safety. https://www.drs.illinois.edu/.

# Know Your Rights

- “It is the policy of the University not to engage in discrimination or harassment against any person….”

- **If you feel your rights have been violated**, please consult the Office of the Dean of Students or reach out to your Academic Advisor for help finding resources.

# Faculty Perspective

Dr. Thomas Kehl-Fie

Associate Professor of Microbiology

Research Interests

- Understanding how starvation shapes infection
- Host-Pathogen Interactions
- Microbial Physiology
- Protein Structure
- Regulation and Gene Expression

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# Student Perspectives

| |
|---|
| Faisal Zaidi, Senior<br>5th semester + SURF, microbiology<br>faisalz2@Illinois.edu |
| Ji Ji Steinlein, Senior<br>4th semester, microbiology<br>amelia4@Illinois.edu |
| Zainab (Zee) Umardeen, senior<br>2nd semester, comparative biosciences, Vet Med<br>zumard2@Illinois.edu |

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# Graduation with *Distinction*

Eligibility for MCB 492 and/or distinction:

- Spend a minimum of 2 semesters in the same lab before final semester
- Earn a minimum of 2 credit hours MCB 290 each semester in that same lab
- Have support of faculty – they will have to write a letter of support
- Give oral presentation within the academic year prior to graduation
- For high/highest distinction consideration, register for MCB 492 in final semester of degree program and write a senior thesis
- For distinction consideration, register for MCB 290 in final semester of degree program

https://mcb.illinois.edu/academics/undergraduate-programs/major-molecular-cellular-biology/graduation-distinction-mcb


# Take Home Points

- Earn course credit and a grade for research experience
- Start early – Be aware of deadlines
- Understand faculty expectations
- Be professional and responsible
- Have fun and learn as much as you can

# Questions

Tina Knox
tmknox@Illinois.edu
mcb.Illinois.edu/undergrad/opportunities/research/

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