These slides were presented at the information session held on December 7, 2015. While the slides are not designed to be entirely self-explanatory, they should provide a useful starting point for exploring various summer research opportunities as well as the summer study abroad program hosted by Imperial College London.

Please feel free to contact Profs. Cole and Leonard with any questions.
Summer Undergraduate Research Grants

Summer Undergraduate Research Grants (Summer URGs) provide a $3,000 stipend to cover living and research expenses for full-time eight week independent academic and creative work in all fields of study. (Supplemental funds are available for projects requiring international travel.) Under faculty supervision, URG winners immerse themselves in projects in the laboratory, the library, or the studio, on campus and around the world. All Northwestern undergraduates are eligible for these grants.

These are distinct from the Academic Year Research grants, which provide $1000 for research reagents. You may receive both summer and academic year grants, and indeed this is common.

http://undergradresearch.northwestern.edu/summerurg
Summer Undergraduate Research Grants

For summer 2016, the application deadline is **March 11, 2016**.

Note that this does take a fair amount of preparation, so **start early**!

The URG website has a Getting Started Guide, but for engineering the best way to get started is to find a professor who is interested in hosting you in his or her lab over the summer. In most cases, these conversations begin months or quarters before the application deadline, so **plan ahead**!

Developing a successful URG project and proposal is a **process**. The staff at the Office for Undergraduate Research are available to help in this process, and historically, **students who work with this office to develop their proposals have a high chance of receiving funding.**

http://undergradresearch.northwestern.edu/summerurg

http://www.youtube.com/playlist?list=PLtnf77BvyL9dZlhNStpkH2xSo-uiqQQ3x
Summer Undergraduate Research Grants

Some Chemical Engineering students receiving Summer URG’s

Edwin Argueta, “Calculation of Charges in MOFs” (Faculty Advisor: Randall Snurr)
Neil Dalvie, “Constructing Modular Biosensors” (Faculty Advisor: Joshua Leonard)
Natalia Majewska, “Glycoengineering of E. Coli” (Faculty Advisor: Michael Jewett)

Some Academic year URG winners

Neil Dalvie, “Developing a Strategy for Constructing Modular Biosensors” (Faculty Advisor: Joshua Leonard)
Naomi Lisse, “Development of Ligand Induced Split-GFP Reconstruction Architecture” (Faculty Advisor: Joshua Leonard)
Other Summer Research Programs at Northwestern

PAID RESEARCH OPPORTUNITIES AT NU PHYSICAL SCIENCES-ONCOLOGY CENTER
• The NU Physical Sciences-Oncology Center is funded by the National Cancer Institute and uses physical sciences-based approaches to understand the molecular changes leading to cancer. The 8-week program includes hands-on laboratory research, weekly seminars in tumor biology, and two two-day workshops.

SUMMER RESEARCH OPPORTUNITY (SROP)
• The mission of SROP has been to increase diversity among students pursuing graduate education and to provide a valuable academic research experience for many students who might not otherwise have access to such opportunities. Each student selected to participate in the program will work with a faculty member in the student's area of interest.

CONTINUING UMBRELLA OF RESEARCH EXPERIENCE (CURE)
• CURE gives underserved college students the opportunity to work alongside top cancer researchers at the Lurie Comprehensive Research Center in downtown Chicago.

McCORMICK SUMMER RESEARCH AWARDS
• McCormick recognizes and encourages excellence in undergraduate research by holding a competition for awards of $5,000 each for qualifying undergraduate summer research.

For more information on the above programs see:
http://www.mccormick.northwestern.edu/students/undergraduate/research-opportunities/summer-programs.html

UNDERGRADUATE RESEARCH ASSISTANT PROGRAM
• URAP offers faculty the opportunity to hire an undergraduate student to work with them on their research or creative projects. http://undergradresearch.northwestern.edu/urap
REU Programs

REU = Research Experience for Undergraduates

Many research centers sponsored by the National Science Foundation (NSF) have summer research programs for undergraduates, which go by the name of REU.

For example, the Materials Research Science and Engineering Center (MRSEC) at Northwestern sponsors an REU program every summer. **The deadline for 2016 is February 15, 2016.**
http://www.mrsec.northwestern.edu/content/educational_programs/reu.htm

Another REU program at Northwestern is run by the International Institute for Nanotechnology. **The deadline for 2016 is February 15, 2016.**
http://www.iinano.org/reu

These programs are usually open to students at the host institution or any other college or university.
Programs are usually 9 or 10 weeks (full time) and pay a nice stipend, for example $4,500 plus on-campus housing and a travel allowance for the Northwestern MRSEC REU in 2015.

Students are typically paired up with a graduate student for the project and become a member of the professor’s research team.

These programs have become increasingly popular, and therefore admission is increasingly competitive. For example, the Northwestern MRSEC REU web site says, “While there is no strict GPA requirement, the GPA of admitted students is typically above 3.5. There is an opportunity for you to explain if difficult circumstances have detracted from your GPA, and we do look favorably upon students who can work through adversity. Most recipients are rising juniors and seniors.”

You must be a U.S. citizen or permanent resident for most (all?) of these REU programs.
Other Summer Research Programs

Naval Research Enterprise Internship Program
http://nreip.asee.org
2016 application closed October 23, 2015 – 2017 competition TBA

DAAD - Summer Research Internship in Germany
http://www.daad.de/rise/en/
Jan 15, 2016 deadline – open now

Amgen Scholars Program
http://www.amgenscholars.com/
Feb 1, 2016 deadline – most hosts

American Chemical Society ACS
https://global.acs.org/global-programs/global-undergraduate-programs/international-research-experience-for-undergrads-ireu/
various deadlines
There are several lists of REU and related programs available on-line:

NSF Engineering REUs
http://www.nsf.gov/crssprgm/reu/list_result.cfm?unitid=10006

Website at Oregon State, with additional links
http://cbee.oregonstate.edu/reus

Chemical Engineering (from 2013, but list may still be useful)
http://www.polymath-software.com/REU2013/
Imperial College London
ChBE London Summer Program 2016
(June 27 – July 29, 2016)
Course credits you can earn

Program lasts 4 weeks: June 27 – July 29

2 course credits:

- ChBE 342 (Chemical Engineering Lab)
- ChBE XXX (1 category A technical elective)

A special topics course covering:
- pilot scale experiments,
- control room operation,
- process start-up and shut-down,
- data collection/interpretation.
Program Expenses

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition ($300/hr for 6 GT credit hrs)</td>
<td>1,962</td>
</tr>
<tr>
<td>Non-resident tuition supplement</td>
<td>2,212</td>
</tr>
<tr>
<td>Imperial College fees</td>
<td>4,000</td>
</tr>
<tr>
<td>Room and board</td>
<td>2,400</td>
</tr>
<tr>
<td>Roundtrip airfare</td>
<td>1,400</td>
</tr>
<tr>
<td>GT Campus Fee + Worldwide Health Insurance</td>
<td>696</td>
</tr>
<tr>
<td>Out-of-pocket food and misc. expenses</td>
<td>700</td>
</tr>
<tr>
<td>NU credit transfer fee</td>
<td>900</td>
</tr>
<tr>
<td><strong>Overall Out-of-state estimated cost</strong></td>
<td><strong>14,270</strong></td>
</tr>
</tbody>
</table>

Expenses estimated from 2015 summer program costs (2016 costs may be a little higher).
# Application Process and Deadlines

<table>
<thead>
<tr>
<th>What you need to complete</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet with Study Abroad advisor</td>
<td>now</td>
</tr>
<tr>
<td>Request letter of recommendation from faculty member</td>
<td>now</td>
</tr>
<tr>
<td>NU online study abroad application with letter of recommendation <a href="http://www.northwestern.edu/studyabroadapp">www.northwestern.edu/studyabroadapp</a></td>
<td>March 1, 2016</td>
</tr>
<tr>
<td>GT online application plus down payment ($500) <a href="http://www.oie.gatech.edu/apply">www.oie.gatech.edu/apply</a></td>
<td>December 15, 2015</td>
</tr>
<tr>
<td>NU Study abroad orientation</td>
<td>May 2016</td>
</tr>
<tr>
<td>Meet course prerequisites (C or better in 212, 307, 321, 322, 323)</td>
<td>June 2016</td>
</tr>
</tbody>
</table>