Welcome to ISyE!

Students: front rows
Parents: back rows
Introduction to Industrial Engineering
Summer, 2014

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Today’s topics

• What is Industrial Engineering?
• ISyE fast-facts
• Curriculum and opportunities (lots!)
  ➢ Courses & project experience
  ➢ Co-ops & internships
  ➢ International study & experience
  ➢ Opportunities around campus
• Where do our graduates go?
  ➢ ...and how much are they paid to go there?
Are You An Industrial Engineer at Heart?

Have you been in this situation before?
Have you...

...seen this situation before?

Source: pardonmeforasking.blogspot.com
What is Industrial Engineering?

• (IIE) Industrial Engineering:
  ➢ Design, improvement and installation...
  ➢ of integrated systems of people, materials, information, equipment and energy
  ➢ drawing on the mathematical, physical, and social sciences.

Business Engineering

or

Analytics

Georgia Institute of Technology
The H. Milton Stewart School of Industrial and Systems Engineering
Have you...

...heard of FASTPASS at WDW?

Source: www.orlandofuntickets.com
From College Board

• IE majors learn how to improve the way factories, hospitals and other organizations run
  ➢ Equipment, materials and people
• It helps to be...
  ➢ A creative but practical problem solver
  ➢ Fan of math and science
  ➢ Pays attention to details
  ➢ Can explain your ideas…
Examples of IE applications

• General examples:
  ➢ Supply chain systems
  ➢ Service systems
  ➢ Manufacturing systems
  ➢ Financial and economic systems
  ➢ Health systems

• Specific examples:
  ➢ Shortening customer waiting in theme parks
  ➢ Streamlining an operating room
  ➢ Distributing products worldwide
  ➢ Manufacturing superior automobiles

Video from IIE
Spare Parts Supply chain example
Location/allocation optimization model

\[
\text{Max} \quad \sum_{izjl} w_j y_{izjl}
\]

\[
s.t. \quad \sum_i F L_i c_i + \sum_{ijk} F S_{jk} s_{ijk} + \sum_{izjl} V S_{ij} y_{izjl} \leq B
\]

\[
\sum_{zl} y_{izjl} \leq \sum_k C A P_{jk} s_{ijk} \quad \forall i, j
\]

\[
0 \leq y_{izjl} \leq d_{izjl} \quad \forall i, z, j, l
\]

\[
\sum_{l \geq m, i} y_{izjl} \leq P_m n_{zj} \quad \forall z, j, m
\]

\[
\sum_k s_{ijk} \leq c_i \quad \forall i, j
\]

\[
c_i, s_{ijk} \in \{0, 1\}
\]
Manufacturing example
Schematic and mathematical models of a production line

Rate Diagram for M/M/3

\[
P_0 = \frac{1}{\sum_{n=0}^{s-1} \frac{\left(\frac{\lambda}{\mu}\right)^n}{n!} + \frac{\left(\frac{\lambda}{\mu}\right)^s}{s!} \left(\frac{1}{1-\frac{\lambda}{s\mu}}\right)}
\]

\[
P_n = C_n P_0
\]

\[
C_n = \frac{\lambda_{n-1} \lambda_{n-2} \ldots \lambda_0}{\mu_n \mu_{n-1} \ldots \mu_1} = \begin{cases} 
\left(\frac{\lambda}{\mu}\right)^n & n = 1, 2, 3, 4, \ldots, s \\
\left(\frac{\lambda}{\mu}\right)^n & n = s + 1, s + 2, \ldots 
\end{cases}
\]
Emory Hospital – Endocrinology Clinic
Challenges

- Appointment start time not clearly defined
  - 53% Patients arrive after *suggested* arrival time

- No pro-active outreach to patients
  - 15% Patient no-show = $600,000 lost revenue

- Inadequate appointment durations
  - On average, each doctor is delayed 10.5 min/patient
Objective Function

\[
\min \sum_{i=1}^{1000} \sum_{j=1}^{n-1} D_{ijk}
\]

\(D_{ijk} = \text{Doctor delay of appointment } j \text{ in schedule } k \text{ under realized session } i\)

\(a_{jk} = \text{length of appointment } j \text{ in schedule } k\)

\(L = \text{length of session}\)

subject to:

\[
\begin{align*}
a_{jk} \mod 5 &= 0 \\
a_{jk} &\geq 15 \\
\sum_{j=1}^{n} a_{jk} &\leq L
\end{align*}
\]

for \(1 \leq j \leq n, \quad \forall k\)
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  ➢ Definitions
  ➢ Examples

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• Where do our graduates go?
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For 24 and 19 consecutive years, the Stewart School has been ranked as the best in graduate and undergraduate programs in the United States, respectively.
Georgia Tech’s Stewart School of Industrial & Systems Engineering

• Program started in 1924, first IE degree in 1945

• Largest IE program
  ➢ About 1400 students
  ➢ Graduate approx. 300/year, or nearly 10% of all IEs in US
  ➢ Over 16,000 alumni (by Spring 2013)
  ➢ ~40% are women

• A third of graduates take first job as consultant

• Nearly one in ten ISyE graduates rise to CEO, CFO, or other top management positions in their respective organizations
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  ➢ Examples
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• Where do our graduates go?
  ➢ ...and how much are they paid to go there?
IE education

- Be critical thinkers
- Be professional
- Be team players
- Be leaders

Iterat i = listA.i();
while (i.Next()) {
    sys.println(i.Next());
}

\[ W = \frac{\rho}{\lambda(1 - \rho)} \]

s.t. \[ \begin{align*}
    & Cx \\
    & Ax = b \\
    & x \geq 0
\end{align*} \]

- Can vote
- Rely on teachers and mentors
- Have to use a lot of “like”s
- Efficient in “curl”s

Intern, Co-op Organizations Intl Programs Lynda.com ...

Georgia Institute of Technology
The H. Milton Stewart School of I
BSIE Curriculum

Senior Design

Eco & Fin

S C Eng.

Quality and Stat

Operations Research

General

Probability
Stochastics
Simulation

Eng Econ

Optimization

Statistics

Required ...

Cal I, II, III, 2602

Physics I, II

Lab Sci 8

Electives

English I, II, Health 2

Economics 3, bus 3

Computing 9

Engineering 9

Humanities 6, SS 9

Free Electives 11
IE Curriculum Summary

• Focus
  ➢ Mathematical modeling and analysis of management and engineering decisions
  ➢ Requires 3 engineering electives to gain broader engineering perspective and to communicate with other engineers

• Compare to other Engineering units
  ➢ Linear and Discrete Math vs. Differential Equations

• Compare to Business School
  ➢ More quantitative and computing, less accounting and management

• 5 Tracks – offer directed flexibility (more next)

• 11 credit free electives (more later)
Concentration

- Allows you to specialize within BSIE
- Concentration is not identified on diploma or transcript
- Allows flexibility in courses of interest
- Allows student to market using named concentrations
- Default is Operations Research
- Need to select by late junior year through OSCAR
- Notify your academic advisor of concentration selection
Free electives

- ISyE recommends LCC 3403 Technical Communications: public speaking + tech writing
  - Alumni survey: most important courses are
    - Public Speaking
    - Technical writing
  - GPA 3.59
- Pursue other interests, very important
ISyE Senior Design project locations
ISyE Senior Design project locations
<table>
<thead>
<tr>
<th>National/International Corporations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AirTran</td>
</tr>
<tr>
<td>• Anheuser-Busch</td>
</tr>
<tr>
<td>• AT&amp;T</td>
</tr>
<tr>
<td>• BellSouth</td>
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<td>• BlueLinx</td>
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<td>• Burger King</td>
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<tr>
<td>• Canvas Systems</td>
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<td>• Carrier Europe</td>
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<td>• Carter’s</td>
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<td>• Caterpillar</td>
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<tr>
<td>• Coca-Cola Enterprises</td>
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<tr>
<td>• Coca Cola North America</td>
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<tr>
<td>• Cooper Industries</td>
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<td>• CR Bard</td>
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<td>• Delta</td>
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<td>• DHL</td>
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<td>• Dick’s Sporting Goods</td>
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<td>• e²M</td>
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<td>• EarthLink</td>
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<td>• EGO North America</td>
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<td>• Elecsys</td>
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<td>• Exel</td>
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<tr>
<td>• F&amp;P Georgia Manufacturing</td>
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<td>• GE Energy</td>
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<tr>
<td>• General Mills</td>
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<td>• Goody Products</td>
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<td>• Grenzebach</td>
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<td>• Gypsum Management &amp; Supply</td>
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<tr>
<td>• H.C. Brill</td>
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<tr>
<td>• Home Depot</td>
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<td>• Honda</td>
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<td>• Intel</td>
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<tr>
<td>• InterContinental Hotels Group</td>
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<td>• Kimberly Clark</td>
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<td>• Kubota Tractor</td>
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<td>• Lockheed Martin</td>
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<td>• Macy’s</td>
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<td>• Manheim Auto Auctions</td>
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<td>• Matador Distributing</td>
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<td>• McKesson</td>
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<td>• MedShare International</td>
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<td>• Michelin</td>
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<td>• Newell Rubbermaid</td>
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<td>• Norfolk Southern</td>
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<td>• Office Depot</td>
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<td>• PACCAR Parts</td>
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<td>• Panasonic</td>
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<td>• Platt Electric Supply</td>
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<td>• Porsche</td>
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<td>• Pratt &amp; Whitney</td>
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<td>• RaceTrac</td>
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<td>• Radiant</td>
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<td>• Reliance Electric</td>
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<td>• Rock-Tenn</td>
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<td>• Ryder</td>
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<td>• Sandvik Mining &amp; Construction</td>
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<td>• Scientific Atlanta/Cisco</td>
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<td>• Siemens</td>
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<tr>
<td>• Southern Company</td>
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<td>• SunTrust</td>
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<td>• Tyco Healthcare</td>
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<td>• United Distributors</td>
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<td>• UPS</td>
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<td>• USG</td>
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<td>• UTi</td>
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<td>• Waffle House</td>
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<td>• Wal-Mart</td>
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<td>• Whirlpool</td>
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<td>• WIKA</td>
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<tr>
<td>• Windstream</td>
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<tr>
<td>• ZF Industries</td>
</tr>
</tbody>
</table>
Project Clients, 2005 - present
Government, Humanitarian, & Health

Local Government
- Atlanta Fulton County Emergency Management Association
- Atlanta Regional Commission
- City of Atlanta
- DeKalb County
- Georgia Poison Control
- MARTA

Humanitarian
- CARE
- Centers for Disease Control
- Flu-Free Schools
- United Nations High Commissioner for Refugees
- United Nations World Food Programme
- World Health Organization

Health/Medical Providers
- Atlanta Gastroenterology Associates
- Cardiovascular Associates
- Children’s Healthcare of Atlanta
- DeKalb Medical Center
- Emory Crawford Long Hospital
- Emory University Hospital
- Northside Hospital
- Piedmont Fayette Hospital
- Piedmont Newnan Hospital
- WellStar Kennestone Hospital
### Project Clients, 2005 - present

#### Local Businesses (Large & Small)

<table>
<thead>
<tr>
<th>Nonprofit</th>
<th>Local Businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atlanta Community Food Bank</td>
<td>• Atlanta Brewing Company</td>
</tr>
<tr>
<td>• Buckhead Baseball</td>
<td>• Atlanta Gas Light</td>
</tr>
<tr>
<td>• Georgia Aquarium</td>
<td>• Atlanta Journal-Constitution</td>
</tr>
<tr>
<td>• Georgia Tech Athletic Association</td>
<td>• Bella Cucina</td>
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<tr>
<td>• Georgia Tech Office of Undergraduate Admissions</td>
<td>• Cbeyond</td>
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<tr>
<td>• High Museum of Art</td>
<td>• Craft-Art</td>
</tr>
<tr>
<td>• Project Open Hand</td>
<td>• CYI Gifts</td>
</tr>
<tr>
<td>• Salvation Army</td>
<td>• iKobo</td>
</tr>
<tr>
<td>• The Children’s School</td>
<td>• Legacy Property Group</td>
</tr>
</tbody>
</table>

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[Georgia Institute of Technology](https://www.gatech.edu)  
The H. Milton Stewart School of Industrial and Systems Engineering
Study in GT

- Similar to next round in sports
Study in GT

• Study: for each credit hour → 2+ hours of self study
  ➢ Reading books
  ➢ Homework
  ➢ Study hall
  ➢ Go to office hours
  ➢ OMED, tutors, Peer Plus...
Today’s topics

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  - Definitions
  - Examples
- ISyE fast-facts
- Curriculum and opportunities (lots!)
  - Courses & project experience
  - Co-ops & internships
  - International study & experience
  - Opportunities around campus
- Where do our graduates go?
  - ...and how much are they paid to go there?
IE labs
IE Labs – real world
Get a “whole” education

• Make sure to graduate
• Enrich your education (do not rush) with
  • Internships and Co-ops
  • Campus organizations
  • Professional organizations
  • Seminars and speakers

• Entrepreneurship
  • Best to try when you are student
Interns and Co-ops

- Both
  - Help you to understand IE better
  - Help you to develop professional and practical skills
  - Get paid
  - Improved job prospects
  - Higher starting pay
- Co-op ~ 20%
  - Significant, progressive experience, on diploma
- Interns > 20 %
  - Flexible
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International program overview

• Benefits
  ➢ Culture, geopolitical systems, society, people
  ➢ Expanded system view
  ➢ Reduced cost for out-of-state students

• Types of programs
  ➢ Faculty-led summer study abroad programs (GT courses)
  ➢ Semester/exchange programs (courses from other institutions)
  ➢ Work abroad
  ➢ LBAT (languages for business and technology)

• International Plan (IP)
  ➢ Recognized on diploma and transcript
  ➢ More...
Popular faculty led programs for IEs

- GT Lorraine: 2 sophomore/junior IE courses, apply early!
- Oxford: flexible
- Beijing/Singapore: 3+ IE senior courses + History
- Many others
Exchange/semester

- HK University of Science and Technology
- National University of Singapore
- Ecole Centrale Paris and INSA Lyon in France
- PUC in Chile
- U of New South Wales in Australia
- TU Munich in Germany
- SNU and Yonsei in Korea
- Tsinghua and SJTU in China
- ITBA in Argentina...
International plan

- Designation on diploma and transcript
- 26 weeks international experience (2 terms)
  - Study abroad, work abroad or research
- 2\textsuperscript{nd} language competency
  - 2 courses at 2xxx level or by competence
- 4 globally focused courses
  - Intl relations, country or region, global econ, & capstone
- Info or application [www.internationalplan.gatech.edu](http://www.internationalplan.gatech.edu)
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Campus forums to learn IE

• Research with faculty
  ➢ Interested in IE graduate studies: best to be in senior year
  ➢ (Interested to understand IE: Co-ops or Interns)

• Seminars and speakers (usually > 1 per week)

• Professional organizations
  ➢ Institute of Industrial Engineers (IIE)
  ➢ Alpha Pi Mu (IE Honor Society –founded at GT)
Other opportunities

• Certificate programs & minors
  • Popular programs: T&M, Languages, Math, CS, Econ, Energy ...

• BS/MS in IE
  • Not available literally
  • BS + MS in 5 years with 2 common courses. The difference is GRE.

• GT1000
  ➢ Help to adjust to GT
  ➢ Has reduced drop rate

• Additional Info
  ➢ http://www.isye.gatech.edu/academics/undergraduate/
Recent National/International ISyE Undergraduate Student Awards

- CICMHE/MHIA Design Competition
- IIE Undergraduate Student Technical Paper Competition
- INFORMS Doing Good With Good OR Student Competition
- INFORMS Undergraduate Operations Research Prize
- L’Oreal Ingenius Competition
2013-2014 ISyE Undergraduate Awards
Recipients

Hongfan (Kevin) Chen
ISyE Alpha Pi Mu Academic Excellence Award and COE Outstanding Undergraduate Research Award

Haley Hahmann
The H. Milton Stewart School of Industrial & Systems Engineering Senior Service Award

Pravara Manasa Harati
Henry Ford Best Junior Award

Caleb Steiner
ALCOA Foundation Scholarship

Alyssa Fornek
KS2 Technologies, Inc. Entrepreneurship Award

Georgia Wang
KS2 Technologies, Inc. Innovative Technology Award
The H. Milton Stewart School of Industrial & Systems Engineering Leadership Award Recipients

Tanay Rajore
President Alpha Pi Mu Honor Society

Not Pictured: Sukirat Bakshi (President Georgia Tech IIE)
Jack C. Webb Scholarship Recipients

David Chen

Ayodeji Hambolu

Heather Humphrey

Tahsin Munir

Not Pictured: Jeremiah Strang and David Weigel
Kurt Salmon Associates Scholarship Recipients

Jordan Avery

Andres Borda Cabal

Patrick Nadeau
Council of Supply Chain Management Professionals Scholarship Recipients

Jordan Avery

Dylan Buczek

Nicholas Buczek

Jialei (Julie) Deng

Erin Lightfoot

Jaclyn McClain

Binita Patel

Tanay Rajore
Georgia Tech IIE Student Chapter Student Award Recipients

Bryce Ferguson
*Outstanding Senior Award*

Anubhav Jain
*Rising Star Award*

Maria Silva Willson
*Top International Student Award*
The World Food Program wins 1st Place in Spring 2014 Senior Design Competition

**Senior Design Finalist**

*(L-R)* Cane Punna, Maria Ayers, Yuvraj Singh, Tahsin Munir, Lakshmi Sangeeta Gadepalli, Ashfaque Kachwala, and Gabriel Rodriguez

**Project Title:** WFP Global Supply Chain Optimization

**Student Team:** Maria Ayers, Lakshmi Sangeeta Gadepalli, Ashfaque Kachwala, Tahsin Munir, Cane Punna, Gabriel Rodriguez, and Yuvraj Singh

**Faculty Advisor:** Dr. Ozlem Ergun

**Project Summary:** The United Nation World Food Programme (WFP), the largest humanitarian organization fighting world hunger, has a decentralized decision making process across its supply chain. In order to centralize commodity, sourcing, and routing decisions, the team created a customizable optimization tool based on a multi-period multi-commodity minimum cost network flow model. The tool outputs the most cost-effective solution given optional constraints over a planning horizon. With this tool, WFP can potentially save $34 million or 12.91% of the supply chain costs.
Spring 2014 Senior Design Competition Finalist: Manheim SureSell

(L-R) Alicia Hess, Alexandra Underwood, Maryann Remy, Hannah Berkhan, Claudia Lara, Layla Bouzoubaa, and Dr. Sebastian Pokutta

**Project Title:** Risk Transfer Mechanism through SureSell

**Student Team:** Hannah Berkhan, Layla Bouzoubaa, Alicia Hess, Claudia Lara, Maryann Remy, and Alexandra Underwood

**Faculty Advisor:** Dr. Sebastian Pokutta

**Project Summary:** Manheim facilitates more than $50 billion annually by auctioning automobiles for outside sellers but only earns revenue itself when cars sell. To encourage sellers to accept bids rather than continuously retry at auction, the team developed a risk-transfer mechanism, SureSell, in which Manheim will pay the difference between the highest bid and the market price of cars that have been auctioned four times but have not yet sold. SureSell returns pricing control to Manheim and increases car conversion rates.
Spring 2014 Senior Design Competition Finalist: Heidelberg Spares

Project Title: Predictive Replacement for Spare Parts of Printing Presses

Student Team: Gian Marco Di Carlo, Benedict Herbst, Christoph Koehler, Lior Koren, Andrea Pava, Mark Vaisberg, and Daniel Zuleta

Faculty Advisor: Dr. Doug Bodner

Project Summary: This project improves the service business of Heidelberg USA, a company that manufactures industrial printing presses, by shifting it towards a proactive service model. Utilizing reliability theory, correlation analysis, optimization, and simulation, the team created a suite of tools that identify economically optimal part replacement times, helping prevent Heidelberg customers from incurring unexpected, expensive machine failures. With this win-win solution, Heidelberg has a potential service revenue increase of up to $49M, and its customers have potential downtime reduction of 40%.
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• Where do our graduates go?
  ➢ ...and how much are they paid to go there?
Where do graduates go?
Others

• Graduate School in
  ➢ IE
  ➢ Business school
  ➢ Professional schools

• Entrepreneur
## 2014 Spring Career and Salary Survey

<table>
<thead>
<tr>
<th>Major</th>
<th>Offer Rate</th>
<th>Placement Rate</th>
<th>Number Reporting Salary</th>
<th>Population of Job-Seekers</th>
<th>Median</th>
<th>High</th>
<th>Low</th>
<th>Median Bonus</th>
<th>Total Reporting Bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Engineering</td>
<td>75.0%</td>
<td>61.1%</td>
<td>19</td>
<td>36</td>
<td>$62,000</td>
<td>$72,500</td>
<td>$26,000</td>
<td>$6,000</td>
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<tr>
<td>Architecture</td>
<td>72.7%</td>
<td>46.2%</td>
<td>5</td>
<td>13</td>
<td>$40,000</td>
<td>$45,000</td>
<td>$31,200</td>
<td>*</td>
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<tr>
<td>Biology</td>
<td>75.0%</td>
<td>33.3%</td>
<td>4</td>
<td>12</td>
<td>$43,900</td>
<td>$54,152</td>
<td>$20,000</td>
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<td>Biomedical Engineering</td>
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<td>13</td>
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<tr>
<td>Business Administration</td>
<td>90.5%</td>
<td>85.7%</td>
<td>13</td>
<td>21</td>
<td>$55,000</td>
<td>$70,000</td>
<td>$35,000</td>
<td>$5,000</td>
<td>5</td>
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<tr>
<td>Chemical Engineering</td>
<td>62.5%</td>
<td>55.8%</td>
<td>28</td>
<td>52</td>
<td>$72,500</td>
<td>$104,000</td>
<td>$55,000</td>
<td>$7,500</td>
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<tr>
<td>Civil Engineering</td>
<td>84.6%</td>
<td>58.6%</td>
<td>14</td>
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<td>61</td>
<td>78</td>
<td>$53,500</td>
<td>$72,000</td>
<td>$20,000</td>
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<td>25</td>
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<tr>
<td>Materials Sci. &amp; Eng</td>
<td>77.8%</td>
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<td>10</td>
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# GT salary survey, Fall 2012

## 2012 Career and Salary Survey (Fall)

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<tr>
<th>Major</th>
<th>Offer Rate</th>
<th>Placement Rate</th>
<th>Number Reporting Salary</th>
<th>Population of Job-Seekers</th>
<th>Salary Offer</th>
<th>Bonus</th>
<th>Total Reporting Bonus</th>
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<td>Aerospace Engineering</td>
<td>47.1%</td>
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<td>$93,000</td>
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<tr>
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<td>23</td>
<td>48</td>
<td>$68,000</td>
<td>$102,000</td>
<td>$56,000</td>
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<tr>
<td>Civil Engineering</td>
<td>76.5%</td>
<td>67.3%</td>
<td>25</td>
<td>49</td>
<td>$52,500</td>
<td>$70,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>Computational Media</td>
<td>88.9%</td>
<td>70.0%</td>
<td>5</td>
<td>10</td>
<td>$68,500</td>
<td>$72,500</td>
<td>$55,000</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>83.3%</td>
<td>83.3%</td>
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<td>12</td>
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<td>$100,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>Computer Science</td>
<td>97.5%</td>
<td>87.8%</td>
<td>32</td>
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<td>$71,250</td>
<td>$150,000</td>
<td>$33,000</td>
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<tr>
<td>Electrical Engineering</td>
<td>89.5%</td>
<td>72.4%</td>
<td>39</td>
<td>58</td>
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<td>$115,000</td>
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<tr>
<td>Industrial Engineering</td>
<td>87.7%</td>
<td>79.5%</td>
<td>56</td>
<td>88</td>
<td>$65,000</td>
<td>$100,000</td>
<td>$40,000</td>
</tr>
<tr>
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<td>71.8%</td>
<td>45</td>
<td>85</td>
<td>$51,026</td>
<td>$72,500</td>
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<tr>
<td>Mechanical Engineering</td>
<td>73.7%</td>
<td>56.8%</td>
<td>43</td>
<td>81</td>
<td>$62,000</td>
<td>$98,000</td>
<td>$46,000</td>
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</table>
Spring 2013 Companies and functions (n=91)

- Manhattan Assoc. (5)
- Accenture (4)
- AirWatch (4)
- Deloitte (3)
- Home Depot (3)
- Avanade, BP, GE, IBM, Kurt Salmon, Mercedes, Microsoft, (2 each)
- ATT, Cisco, Capgemini, Caterpillar, Coca-cola, Dell, Deutsche Bank, FedEx, ...

- Analyst (25)
- Consultant (22)
  - Management (9)
  - SC (8)
  - Financial (4)
  - Software (2)
  - Other (IT, Tech service, … 3)
- Logistics (8)
- Grad School (7)
- Engineer (6)
- Mfg (5)
- QC, Marketing, financial analysis (2 each)
Alumni survey on income range (n = 264 in 2007, n = 179 in 2012)
Questions
The concentration in university education

<table>
<thead>
<tr>
<th>Eco &amp; Fin</th>
<th>SC Engg</th>
<th>Q. &amp; Stat</th>
<th>OR</th>
<th>General</th>
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<table>
<thead>
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<th>Required</th>
<th>Electives</th>
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<tr>
<td>Cal I, II, III, <strong>2602</strong></td>
<td>English I, II, Health 2</td>
</tr>
<tr>
<td>Physics I, II</td>
<td>Economics 3, business 3</td>
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<tr>
<td>Lab Sci 8</td>
<td>Computing <strong>9</strong></td>
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<td><strong>Free Electives 11</strong></td>
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[Image: The concentration in university education diagram]
### Concentration courses and projected career path

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Depth courses</th>
<th>Jobs students tend to like</th>
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<tbody>
<tr>
<td>EFS</td>
<td>Economics in supply chain, financial analysis</td>
<td>Financial institutes and finance in corporations</td>
</tr>
<tr>
<td>OR</td>
<td>Optimization, Stochastic process, simulation</td>
<td>Graduate school, analysts</td>
</tr>
<tr>
<td>Q &amp; Stat</td>
<td>Statistics, quality, regression, data mining</td>
<td>Data analysis, process engineer, quality control</td>
</tr>
<tr>
<td>SCE</td>
<td>Logistics, manufacturing</td>
<td>SC, Logistics, consulting</td>
</tr>
<tr>
<td>General</td>
<td>One from each of the above 4 areas</td>
<td>All of the above</td>
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</tbody>
</table>
Have you heard “Imaginary Engineering”?
Emory Hospital – Endocrinology Clinic Design Strategy

Goal
Improve Quality of Care

Doctor Delay
Patient Wait Time

Can Control
Duration of Appointments
Number of Appointments

Cannot Control
No-show Rate
Patient Arrival Patterns
Follow up questions to...

- Chen Zhou (Pronounced Jo)
  Assoc. Prof and Assoc. Chair, Undergraduate Programs
  H. Milton School of Industrial and Systems Engineering
  404.894.2326
  czhou@isye.gatech.edu

- Dima Nazzal
  General Faculty and Director of Student Services
  H. Milton School of Industrial and Systems Engineering
  404.385.0272
  dima.nazzal@gatech.edu

- Weblinks
  - www.isye.gatech.edu
  - www.buzzport.gatech.edu
Registration... Advisors

- Buzzport (or oscar.gatech.edu)
- Freshman
  - Lab science (Chem, EAS or BIO, see ISyE website)
    - Chem 1310 gives flexibility later on. Please take it in Spring
  - Math: AP credits, you need to judge, some happy, some regret using the AP credits
  - General Psyc, or Econ 2100, or US History
  - CS 1301 in Spring
  - Global perspectives
  - Complete Math 1501 in first 30 hours
  - ENGL 1101/1102 in first 60 hours
- Transfer
  - Personalized flow chart
## Sample Course Sequence

<table>
<thead>
<tr>
<th>Sem</th>
<th>Sample Course Sequence</th>
<th>Hours</th>
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<td><strong>MATH 1501 CALCULUS I</strong></td>
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<td></td>
<td><strong>ENGL 1101 ENGLISH COMPOSITION I</strong></td>
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<td><strong>PSYC 1101 GENERAL PSYCHOLOGY</strong></td>
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<td></td>
<td><strong>LAB SCIENCE CHEM 1301 (Biol, Eas)</strong></td>
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<td><strong>MATH 1502 CALCULUS II</strong></td>
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<td><strong>ENGL 1102 ENGLISH COMPOSITION II</strong></td>
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<td><strong>PHYS 2211 INTRODUCTORY PHYSICS I</strong></td>
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<td><strong>CS 1371 COMPUTING FOR ENGINEERS</strong></td>
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<td>Hours</td>
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<td>ISYE 3232 STOCHASTIC MFG &amp; SERVICE SYSTEMS</td>
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