INTRODUCTION TO ISYE 4800 SENIOR DESIGN PRE-PLANNING

March 3, 2020
Topics

- What are 4106 and 4800?
- What you need to finish in 4800?
- When you need to do what?
## Faculty Team in 4800 – Summer 2020

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Role</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Nazzal</td>
<td><a href="mailto:dima.nazzal@gatech.edu">dima.nazzal@gatech.edu</a></td>
<td>Coordinator</td>
<td>Info session, coordinate activities</td>
</tr>
<tr>
<td>Prof. Nazzal</td>
<td><a href="mailto:dima.nazzal@gatech.edu">dima.nazzal@gatech.edu</a></td>
<td>Co-Examiner</td>
<td>Project screening</td>
</tr>
<tr>
<td>Prof. McGinnis</td>
<td><a href="mailto:leon.mcginnis@gatech.edu">leon.mcginnis@gatech.edu</a></td>
<td>Co-Examiner</td>
<td>Project screening</td>
</tr>
</tbody>
</table>
What is Senior Design in ISyE

• Student teams seek a client’s IE-related opportunities
  – Provide significant value to client using IE methodology
• What do project clients get out of it?
  – Implementable ideas, supporting analysis, prototype software, ...
  – Significant value to client (a course requirement/focus)
• What do GT students get out of it?
  – Transition from academic to professional life
    • Professionalism, communication, project management, teamwork, etc.
  – Real engineering project experience
Senior Design is more than other courses

• Be inspired to do something impactful
• Be professional under pressure
• Be prepared to broaden and deepen knowledge
• Ask the right questions before finding the right answers
• Improve your communication skills
• Improve your analysis, design, and computing skills
• A lot of help, if you are looking for it
• ...
Be professional

• Be punctual
• Have a good attitude
• Take initiative
• Be responsible and reliable
• Develop work ethic
• Be prepared
• Cooperate
• Be honest and ethical
• ...

To paraphrase Dr. Adam Grant: “Argue like you're right, but listen like you're wrong. Instead of arguing to win, you can argue to learn. Acknowledge when a good point has been made. Acknowledge your weaknesses.”
Professionalism starts now!

- Failure to meet deadlines or follow instructions can lead to grade deductions carried to 4106.
Prerequisites for 4106 Senior Design

1. ISYE 3025, ISYE 3133, ISYE 3232, ISYE 3044 (and the prerequisites to these courses)

2. 4 of 6 ISyE concentration elective courses

3. Successful completion of ISYE 4800
   - Approved preproposal
     1. Team Composition
     2. Client Notification
     3. Project Pre-proposal
   - Sufficient contribution to an approved preproposal
Tasks in (or before) ISyE 4800

1. Register for ISyE 4800A/4800Q/4800R
   - Q is for students taking SOUP classes (summer only)
   - R is for study abroad students
   - A is for everyone else
   - If you already took 4800 before, you must re-take

2. Form team of size from 6 to 8

3. Find potential clients
   - Postings on ISyE website
   - Past senior design teams
   - Internships and co-ops
   - Cold-calling
   - Site visit (virtual) is required

4. Develop the pre-proposal and get approved
# 4800 Deliverables and Schedule

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Details</th>
<th>4800 Summer semester</th>
<th>4800 Fall semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team composition report</td>
<td>Teams submit team members, liaison, and resumes</td>
<td>Monday in the week final exams starts in spring semester</td>
<td>Monday of 5th week in fall</td>
</tr>
<tr>
<td>Client notification report</td>
<td>Teams submit a report listing the client name and nature of the project</td>
<td>3rd Monday in the summer</td>
<td>7th Monday in fall</td>
</tr>
<tr>
<td>NDA Routing Form</td>
<td>If your client requires an NDA</td>
<td>As soon as you have talked to your client. Process for approval is lengthy</td>
<td>As soon as you have talked to your client. Process for approval is lengthy</td>
</tr>
<tr>
<td>Initial pre-proposal</td>
<td>Teams submit initial pre-proposal</td>
<td>7th Monday in the summer</td>
<td>June 22</td>
</tr>
<tr>
<td>Meetings with project screener/examiner</td>
<td>We will work with you to shape up the pre-proposal</td>
<td>Week of July 6th</td>
<td>10th Monday in fall</td>
</tr>
<tr>
<td>Revised pre-proposal</td>
<td>If the initial proposal is not approved, a team can submit a second one. It can be an enhanced version of the first or another project with a different client</td>
<td>10th Monday</td>
<td>July 13</td>
</tr>
<tr>
<td>Peer evaluation</td>
<td>Students assess every other team member (including themselves) for contribution</td>
<td>12th Tuesday</td>
<td>16th Tuesday</td>
</tr>
<tr>
<td>Permit to ISYE 4106 to your section</td>
<td>Registration permit to your section will be issued if you satisfy the requirements</td>
<td>Phase II registration during the 4106 semester</td>
<td>Phase II registration during the 4106 semester</td>
</tr>
</tbody>
</table>

May 26

Week of July 6th
Step 1: Build yourself a team

• **KEY: Be able to trust their work & work ethic**
• Similar academic goals: A for winners vs. D for done
• Diverse skill set: Cover all skills with one or two members
• Compatible 4106 class schedules: no classes conflict with one of two team class schedule: MW or TR sections

<table>
<thead>
<tr>
<th>Time</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>R</th>
<th>F</th>
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<tbody>
<tr>
<td>12:30 – 3:15</td>
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<td>TR</td>
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<tr>
<td>12:30 – 3:15</td>
<td>MW</td>
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<td>MW</td>
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<tr>
<td>6:30 – 9:15</td>
<td></td>
<td>MW</td>
<td>TR</td>
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<td>TR</td>
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</tbody>
</table>
Step 1: Build yourself a team (cont.)

• Students you have worked with, been in class with, post on 4800 Piazza board

• Once you have a team, get together outside of senior design
  – You’ll get along better during the semester
Team Composition Report template

- Each team submits one report to course website by the team liaison
- Under extenuating circumstances, the coordinator has the coordinator to add, remove, and change the team
CLIENT COMPOSITION
Step 2: Finding a project: Sample of past project topics

- Activity valuation
- Capacity management
- Customer service enhancement
- Demand/price forecasting
- Distribution network design
- Energy usage reduction
- Equipment replacement planning
- Facility layout/redesign
- Flow management
- Inventory planning
- Manufacturing line/cell design
- Materials handling

- Money/capital management
- Pricing strategy
- Preventative maintenance scheduling
- Process design/redesign
- Production scheduling
- Supply chain design
- Technology integration
- Vendor selection
- Waste reduction
- Workforce scheduling
- Flow of material, people, documents
Project Clients, 2005-2019, (Feel free to add to the list!)

- Acuity Brands
- ADEX Machining
- Aerostar
- AGI Resources
- AirTran
- Alternative Apparel
- Amazon
- American Birkebeiner
- American CyberSystems
- Anheuser-Busch
- AT&T
- Atlanta Brewing Company
- Atlanta Community Food Bank
- Atlanta Gas Light
- Atlanta Gastroenterology Associates
- Atlanta Journal-Constitution
- Atlanta Regional Commission
- Avery Dennison
- Avnet
- Bella Cucina
- BellSouth
- BlueLine
- Buckhead Baseball
- Burger King
- Burt's Bees
- Cad
- Canvas Systems
- Cardiovascular Associates
- CARE
- Carrier Europe
- Carter's
- Caterpillar
- Cheyond
- Centers for Disease Control and Prevention
- Centro de Agencias
- Chick-fil-A
- Chico's
- Children's Healthcare of Atlanta
- Cisco Systems
- City of Atlanta
- Coca-Cola
- Coca-Cola Enterprises
- Coca-Cola North America
- Coca-Cola Refreshments
- Comcast
- Cooper Industries
- Cox Communications
- CR Bard
- DeKalb
- DeKalb County Police Department
- DeKalb Medical Center
- DeKalb
- DHL
- Dick's Sporting Goods
- e2k
- EarthLink
- EGO North America
- Elsevier
- Emory Crawford Long Hospital
- Emory University Healthcare
- Emory University Hospital
- Energy Spark
- Enraf
- Equifax
- Exel
- Express
- F&P Georgia Manufacturing
- Flu-Free Schools
- Flying Lizard Motorsports
- Fulton County
- GE Energy
- General Mills
- Georgia Aquarium
- Georgia Poison Control
- Georgia Power
- Georgia Tech Athletic Association
- Georgia Tech Campus Recreation Center
- Georgia Tech Capacity Planning and Space Management
- Georgia Tech Library
- Georgia Tech Office of Undergraduate Admissions
- Goodys Products
- Grenoble
- Gwinnett County Public Schools
- Gymnasium Management & Supply
- H.C. Brill
- Heidelberg
- High Museum of Art
- HNI
- Home Depot
- HOK Furniture
- Honda
- Honeywell
- House of Cheatham
- ICF International
- IKEA
- Kimberly-Clark
- Kinetic
- LinkedIn
- Intercontinental Hotels Group
- Interface
- John Deere
- JC ATM Services
- Kimberly Clark
- Kubota
- Landis Gyr
- Legacy Property Group
- Lockheed Martin
- Macy’s
- Manheim Auto Auctions
- Marcus Autism Center
- Marmi Natural Stone
- Mars
- Matador Distributing
- McKenny’s
- McKesson
- Medline
- MedShare International
- Midtown Consulting Group
- Monday Night Brewing
- MDC
- NCR
- Newell Rubbermaid
- Next Wave
- Nissan
- Norfolk Southern
- Northside Hospital
- Office Depot
- OHL
- PACCAR Parts
- Panasonic
- PepsiCo
- Phillips 66
- Piedmont Fayette Hospital
- Piedmont Heart Institute
- Piedmont Hospital
- Piedmont Newnan Hospital
- Platt Electric Supply
- Porsche
- Pratt & Whitney
- Predictive
- Project Open Hand
- Publix
- RaceTrac
- Relay Bikes
- Radiant
- Rainmaker
- Balance Electric
- Rainier
- RockTenn
- RockTeer
- Roswell Recycling
- Ryder
- Safilo
- Salvation Army
- Sandz
- Sandvik Mining & Construction
- ScheduleWise
- Scientific Atlanta/Cisco
- Shaw Industries
- Sherwin Williams
- Siemens
- Southeastern Pneumatic
- Southern Company
- Spectral Response
- Starline Associates
- Summit Industries
- SunTrust
- SyrQ Solutions
- The Children's School
- Telextron
- Titan
- Toyota
- Trivantage
- Tyco Healthcare
- Tyco Safety Products
- UNC Healthcare
- UNICEF
- United Distributors
- United Nations High Commissioner for Refugees
- United Nations World Food Programme
- UPS
- UPS Capital
- UPS Global Health
- Vertical Brands
- VF
- Virgin America
- Virginia Dominion Power
- Volunteer Express
- Waffle House
- Wal-Mart
- Weir Furniture
- WellStar Kennestone Hospital
- Whirlpool
- WJA
- Windstream
- World Health Organization

CREATING THE NEXT™
Step 2: Finding Project: Requirements

- Requirements
  - Design
    - Make recommendations to change an existing system or design a new system, not just a tool or an analysis or a model
  - ISyE knowledge/methods
  - Magnitude
    - 12 hrs/person/week = 1080-1440 hrs total (full-time job ≈ 2000 hrs)
  - Value to client
    - Part of Senior Design is learning to identify which problems are worth your time to fix and which are not
- Also...
  - Should be very interesting to you
    - If you don’t like it now, you’ll hate it after 1000+ hours!
Step 2: Finding a project

**Approaching potential clients**

- How to approach companies for a project
  - Engineers, managers, etc. – they have the work to be done!
    - Not human resources or university relations
    - It’s better to have a higher-level (VP, Director, or higher) project sponsor/advocate
  - Ask in a way they understand
    - IEs vs. non-IEs
  - Make a personal approach
    - Personal visit, phone call
  - Be prepared
    - “Elevator speech” & details
    - Information about Senior Design & you
Expectations of Project Clients

• Commitment to providing access to data & site

• Responsiveness; your graduation depends on getting timely responses

• Selection of a primary contact for team
  – Client-side organization (meetings, site visits, data, questions, etc.)

• True interest in project
  – Real value, not busywork!
Risk and reward factors in project/client selection

• Consulting firms
• Startups
• Small operations
• Access
  ▪ Information and Data
  ▪ Response time
  ▪ Location
Client notification

• Organization Name
• Client Contact Name, Email, Phone
• Describe the Organization you will work with
• Describe the system you propose to study, design, re-design
• Describe the opportunities for improvement
• Describe the relationship of your potential project to the ISyE curriculum
Client may share proprietary or confidential information

Proprietary
• Formula
• Financial info (salary)
• Methods or strategies
• Marketing plans
• Customer list
• IT system details
• ...

Confidential
• ID
• SSN
• Account info
• Intellectual property
• Patient information
• Passwords
• ...

Client may ask you to sign their legal agreement
What should you do?

1. Ask the client to filter or mask the data to avoid the NDA. It is just a one-semester undergrad project

2. Undesirable: Individually sign the client’s NDA
   1. GT employees are not allowed to sign client’s NDA
   2. It must allow GT employee acceptable access, or no grade!
   3. Quick and dirty in the short run, risk in the long run

3. Individually sign client’s NDA to allow access to data and at the same time start the GT-Client NDA process

4. **GT-Client NDA:** If you must have an NDA, below is the way to go.
Student NDA process

1. Check if Client requires NDA
   - Yes: Coordinator will review, ask you for more information, then send to GT legal
   - No: Find another Client

2. Fill out and send NDA routing form to coordinator
   - Sign individual NDAs with client (Must meet 3 conditions)
   - Negotiations Successful?
     - Yes: Coordinator sends you PIAs for individual signatures and Signature Sheet
     - No: Students sign PIAs and send as one individual file to coordinator
   - Students acquire signatures of all GT employees who will access protected information

3. GT legal negotiates with Client
   - Students return signature sheet to coordinator

4. You have a Client
   - Done. Remember your NDA commitments

*Try to avoid NDAs
*This step can be done throughout the ISYE 4106 semester
*As soon as all signatures are acquired and before final report submission
*Three conditions are:
  1. Client NDA cannot name GT as a party to the NDA (faculty cannot sign client's NDA)
  2. NDA must permit GT students to discuss client's info with teammates
  3. NDA must permit GT students to discuss with GT faculty & staff if faculty and staff need access to client's info to advise or evaluate project
NDA Routing form

- Liaison fills out
  - Company’s contact info
  - Class/Project details
- Send it to me for my signature and date
- I will send it to GT Legal. Please do not contact GT Legal.
1. Liaison gets each member to fill out these 4 fields, and sign
2. Liaison combines into single file
3. Liaison sends the file to coordinator
The signature sheet SS (2nd page)

Please return a copy of this page with the appropriate signature(s) to:
matthew.riddle@legal.gatech.edu OR (fax) 404.894.3120 (NOTE: A cover page is not necessary.)

*NDA with: Atlanta National League Baseball Club, LLC

Attorney: SDE GT OLA File: NDA-5150 POC: Dima Nazzal

GT Entity GIT Effective Date: August 3, 2018 Termination Date: December 15, 2018

Term of Confidentiality: 3 years/initial date of disclosure Pertaining to: customer traffic flow

during baseball games, including surveillance videos, customer feedback and transaction
data and the Point of Sale for the transaction: ISYE 4106, Fall 2018.

Required Signatures

The employees who have signed below acknowledge that they will have access to proprietary information
disclosed under the referenced NDA, have read the NDA and agree to comply with the terms and conditions
thereof.

Signature: ___________________________ Name: ___________________________
Date: ___________________________

U.S. Citizen ☐ Green Card ☐ Neither ☐
If Neither, Country of Origin: ___________________________

Signature: ___________________________ Name: ___________________________
Date: ___________________________

U.S. Citizen ☐ Green Card ☐ Neither ☐
If Neither, Country of Origin: ___________________________

Signature: ___________________________ Name: ___________________________
Date: ___________________________

U.S. Citizen ☐ Green Card ☐ Neither ☐
If Neither, Country of Origin: ___________________________

Required Signatures

Bring with you to presentations
Get signatures
Submit with final report
We cannot read without having signed
PRE-PROPOSAL
REQUIREMENTS
Project Pre-Proposal

- Convince project screeners/examiners that your project is appropriate
  - Design content, ISyE methodology, difficulty, value

- Convince with evidence: data/analysis, not just (buzz) words!
  - Problem statement: why should we care about this project, what is the underlying problem, what opportunities are you planning to pursue
  - Data/analysis to support the size/scope/value of problem (opportunities)
  - Proposed type of deliverables
  - Connection to ISyE discipline

- Writing quality (spelling, grammar, typos) counts too!

- Get help from writing specialist

You will receive permit for 4106 only if your pre-proposal is APPROVED by the senior design examiners and your contribution is satisfactory

We will guide you through the process but it’s on you to get your project into an approvable form. You don’t have a good project you will NOT get permit.
• Show evidence that the project will be valuable...

  – This is a CRITICAL skill.

  • If you’re good at making the case that you’re worth paying, you’re likely to have a very successful career in any field.

  – You must learn this... in Senior Design.
Preproposal Template

- Who is the Client?
- Client contact information
- What is the system?
- Is an NDA required?
- What is the Problem/Opportunity?
- What type of information you need to take on the challenge?
- What is the value of the opportunity you identified?
- What will you deliver to the client?
- What is the relationship to the ISyE curriculum?

First Draft Acceptance Rate:
  - < 10% are accepted
  - > 50% require major changes
  - ~ 15% need to change client
What is an Problem Statement?

- It requires:
  - A **motivation** (e.g., sales are down by 13% last year or customer ratings went down, etc.)
  - A **goal** (e.g., reduce cost, increase revenue, improve customer service, etc.) and this should be consistent with the motivation
  - The **opportunity**: What do you bring to the table to achieve the goal? (e.g., an inventory control system, truck routing, consolidating shipments, predictive maintenance process, etc.)
  - **Success Metrics**: How we measure your success in the project? (e.g., percent decrease in labor cost)
    - Remember that it’s impossible to measure in the timeframe of senior design
  - We will evaluate your work product based on the strength of the evidence that your proposed solution:
    - is the right **approach** to achieve the goal, and
    - the magnitude at which it achieves the goal
Tips and Pitfalls

• **Goal vs. Tasks:** You are not supposed to be given tasks. It’s your job to identify the tasks to achieve the goal
  – Start with the Goal
  – Logically dissect all the steps in the process that can help achieve the goal,
  – Identify the alternatives for exploiting them,
  – Prioritize based on impact and effort.

• **Disparaging the Client will not be tolerated**
  – Do NOT motivate your project by pointing the shortcomings of the current process
  – Focus on what you bring to achieve the goal not what the client is not doing
DON’T FORGET!!

• REGISTER FOR ISYE 4800/4800R/4800Q

• 4106 PREREQUISITES

• START NDA ASAP, FOLLOW INSTRUCTIONS

• PRE-PROPOSAL MUST INCLUDE DATA AND VALUE
Communications

• Meaningful email subject line
• Meaningful document name (pay attention to template)
  – Team: Liaison’s name
  – Preproposal: TeamNumber + ClientName + Type of submission
    • E.g. 11 Staples Pre-proposal (to be given)
• Piazza
Warnings

• You must contribute to your team’s pre-proposal; being out of town is NOT an excuse.

• You cannot drop a team without Associate Chair approval
  – Once your pre-proposal has been submitted, individuals will not be allowed to switch teams.
    • Obvious exception: serious health issues, etc.
    • No exceptions for unhappiness with team, project, expected grade, etc.

• Failure to complete any ISyE required course or 4 of 6 concentration classes will result in you being dropped from your team
• Do I have to meet with an examiner after initial pre-proposal submission?
  – Yes, unless you live/work outside of driving distance.

• What if I live/work far away this semester?
  – You’re still expected to contribute to the project-finding and pre-proposal effort. Shirkers will be penalized; most semesters, one or more students have not been given a permit with the rest of their team.

• Will you have office hours?
  – Don’t wait for office hours. Time is of the essence, so ask your questions right away.
    • Send me your questions by email – wherever I am, I’ll be able to give you a pretty quick answer.
    – Piazza is an excellent way of communication on the course website (Canvas)

• What happens if we miss the deadline for pre-proposal submission?
  – 1/3 letter grade deduction from your ISYE 4106 grade.
What to look for in 4106

• Advisor assignment, toward the end of the 4800 semester
• Mandatory Peer Evaluation toward the end of the semester
• Mandatory 4106 Introduction session: Wed in first week of class, 6 – 8 PM
• Exciting work of senior design
  – Freedom
  – Challenges
  – Achievements
  – ...
## Current Projects

<table>
<thead>
<tr>
<th>Client</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waffle House</td>
<td>Dynamic Restaurant/Division Assignment</td>
</tr>
<tr>
<td>Scientific Games</td>
<td>Facility Layout, order fulfillment</td>
</tr>
<tr>
<td>PPG Industries</td>
<td>Inventory management</td>
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<tr>
<td>GWCCA</td>
<td>Waste reduction program</td>
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<tr>
<td>Inspire BWW</td>
<td>Forecasting and Inventory</td>
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<tr>
<td>HD Supply</td>
<td>Material Flow</td>
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<tr>
<td>Starbucks Brewing</td>
<td>Layout Design, Equipment Optimization</td>
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<tr>
<td>Polygon</td>
<td>Throughput increase and overtime reduction</td>
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<tr>
<td>Atlanta Humane Society</td>
<td>Adoption matching system and pet care process improvement</td>
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<tr>
<td>Delta</td>
<td>Spare engines inventory allocation</td>
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<tr>
<td>Chick-fil-a</td>
<td>Inventory Delivery Process</td>
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<tr>
<td>Peachtree Presbyterian Church</td>
<td>Guests flow and parking</td>
</tr>
<tr>
<td>Emory Healthcare</td>
<td>OR Carts Stock Levels</td>
</tr>
<tr>
<td>Starbucks Distribution</td>
<td>Regional DCs fulfillment process</td>
</tr>
<tr>
<td>Christian Dior</td>
<td>Retail stores inventory planning</td>
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<tr>
<td>Kliklok-Woodman</td>
<td>Job shop Scheduling and Layout</td>
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<tr>
<td>Veritiv</td>
<td>Inventory policies</td>
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<tr>
<td>BrandSafway</td>
<td>Inventory allocation and management</td>
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<tr>
<td>ABW</td>
<td>Material flow and layout</td>
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<tr>
<td>Dell</td>
<td>LTL Carrier selection</td>
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<tr>
<td>Tindall</td>
<td>Concrete stacking and retrieval</td>
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<tr>
<td>American Woodmark</td>
<td>Production line yield improvement</td>
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<tr>
<td>Kinaxis</td>
<td>Production planning</td>
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<tr>
<td>Fiserv</td>
<td>Warehouse material flow and layout</td>
</tr>
<tr>
<td>GT Dining Services</td>
<td>Expanding and improving dining services</td>
</tr>
<tr>
<td>Goodr</td>
<td>Supply chain strategy for composting and recycling</td>
</tr>
<tr>
<td>Nolan Transportation Group</td>
<td>Shipping lanes consolidation</td>
</tr>
<tr>
<td>Williams-Sonoma</td>
<td>DC outbound process improvement</td>
</tr>
<tr>
<td>Cox Automotive</td>
<td>Retail Vehicles Reconditioning Process Flow</td>
</tr>
<tr>
<td>The Home Depot</td>
<td>Delivery modes, product allocation</td>
</tr>
</tbody>
</table>
Questions?

• General questions: Post on Piazza
• Personal questions: Email Prof. Nazzal dima.nazzal@gatech.edu
• Later, your assigned examiner or advisor
• Please don’t ask other faculty
Questions you should know the answer to...

- What are the prerequisites for 4106?
- What do you do if your client wants an NDA?
- What is the process to get GT-client NDA?
- What do you have to do this semester?
- How to get permit to register for 4106?
- I will study abroad, can I be in 4800?
- I will co-op in Seattle, can I be in 4800?
- What happens if I withdraw from 4th concentration elective?
- What happens if I fail one of the 4 concentration electives?