Introduction to ISyE 4800 Senior Design Pre-planning

Updated June 20, 2018
Topics

• What are 4106 and 4800?

• What you need to finish in 4800?

• When you need to do what?
## Faculty and staff team in 4800

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Role</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harry Sharp</td>
<td><a href="mailto:hsharp@isye.gatech.edu">hsharp@isye.gatech.edu</a></td>
<td>Administrator</td>
<td>Schedule, reservations, report, website</td>
</tr>
<tr>
<td>Dima 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>Dima 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>TBD</td>
<td>TBD</td>
<td>Co-Examiner</td>
<td>Project screening</td>
</tr>
</tbody>
</table>

6/28/2018
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

6/28/2018
Senior Design is more than courses

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

- Be punctual
- Have good attitude
- Take initiative
- Be responsible and reliable
- Develop work ethic
- Be prepared
- Cooperate
- Be honest and ethical
- ...
Professionalism starts now!

• Misbehavior can lead to grade deductions carried to 4106.
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
     2. Client
     3. Project
   • Sufficient contribution to preproposal
Purpose of 4800 pre-planning

• Effective use of senior design time
  • Are of low intensity: finding team members
  • Involve wait and delay: wait for client responses
Tasks in (or before) ISyE 4800

1. Register for ISyE 4800A/4800Q/4800R
   - Q is for students taking SOUP classes
   - 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 pre-proposal and get approved
## 4800 Deliverables and Schedule

<table>
<thead>
<tr>
<th>Details</th>
<th>4800 Summer semester</th>
<th>4800 Fall semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information session</strong></td>
<td>A 60 minute session is given to outline the details of 4800</td>
<td>The 1&lt;sup&gt;st&lt;/sup&gt; Tuesday in spring semester, 11 AM - 12 PM</td>
</tr>
<tr>
<td><strong>Team composition report</strong></td>
<td>Students submit team members, liaison, and resumes</td>
<td>Monday in the week final exams starts in spring semester</td>
</tr>
<tr>
<td><strong>Client notification report</strong></td>
<td>Students submit a report listing the client name and nature of the project</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; Monday in the summer</td>
</tr>
<tr>
<td><strong>NDA Routing Form</strong></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>
</tr>
<tr>
<td><strong>Initial pre-proposal</strong></td>
<td>Students submit initial pre-proposal</td>
<td>7&lt;sup&gt;th&lt;/sup&gt; Monday in the summer</td>
</tr>
<tr>
<td><strong>Meetings with project screener/examiner</strong></td>
<td>A faculty member will be assigned to work with you to shape up the pre-proposal</td>
<td></td>
</tr>
<tr>
<td><strong>Revised pre-proposal</strong></td>
<td>If the initial proposal is not approved, a student can submit a second one. It can be an enhanced version of the first or another project with a different client</td>
<td>10&lt;sup&gt;th&lt;/sup&gt; Monday</td>
</tr>
<tr>
<td><strong>Peer evaluation</strong></td>
<td>Students assess every other team member (including themselves) for contribution</td>
<td>12&lt;sup&gt;th&lt;/sup&gt; Tuesday</td>
</tr>
<tr>
<td><strong>Permit to ISYE 4106 to your section</strong></td>
<td>Registration permit to your section will be issued if you satisfy the requirements</td>
<td></td>
</tr>
</tbody>
</table>
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>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 – 2:45</td>
<td></td>
<td>TR</td>
<td></td>
<td>TR</td>
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</tr>
<tr>
<td>12:10 – 2:55</td>
<td>MWF</td>
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<td>MWF</td>
<td></td>
<td>MWF</td>
</tr>
<tr>
<td>6:00 – 8:45</td>
<td></td>
<td></td>
<td>MWF</td>
<td>TR</td>
<td></td>
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</tbody>
</table>
Step 1: Build yourself a team

• 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 person

File name: team liaison's last name + Team

Date:

Team members in a table (including Liaison) and information in alphabetical order

<table>
<thead>
<tr>
<th>Family name*</th>
<th>Given name</th>
<th>Working GT e-mail</th>
<th>Preferred 4106 section**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

* Please use * to indicate the liaison person.

** All team members must have classes that can fit in the same 4106 section type

Section type MW: MWF 12:00 – 3:00, W 6:00 – 9:00

Section type TR: TR 12:00 – 3:00, WR 6:00 – 9:00

Resume for all members in alphabetical order.

Compile everything together into a single file to submit to T-square.
Under extenuating circumstances...

• The coordinator have the authority to change the team:
  • Add, remove, change the team
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, 2005-2015, (Feel free to add to the list!)

- Acuity Brands
- ADEX Machining
- Aerotrac
- AGI Resources
- AirTran
- Alternate 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
- Bellaluna
- BellSouth
- BlueInx
- Buckhead Baseball
- Burger King
- Burt's Bees
- CAB
- Canvas Systems
- Cardiovascular Associates
- CARE
- Carrier Europe
- Carter's
- Caterpillar
- Civvy
- Centers for Disease Control and Prevention
- Centro de Aulas
- 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
- CraftArt
- Crosslink
- CTY Gifts
- DeKalb County
- DeKalb County Police Department
- DeKalb Medical Center
- Delta
- DHL
- Dick's Sporting Goods
- e2M
- EarthLink
- EGO North America
- Elyxys
- Emory Crawford Long Hospital
- Emory University Healthcare
- Emory University Hospital
- Energy Dispatch
- Entral
- 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
- Goody Products
- Greensbach
- Gwinnett County Public Schools
- Gypsum Management & Supply
- H.C. Brill
- Heidelburg
- High Museum of Art
- HNI
- Home Depot
- HON Furniture
- Honda
- Honeywell
- House of Cheatham
- ICF International
- IKEA
- iKobo
- Innovate
- Intel
- InterContinental Hotels Group
- Interface
- iParameters
- JC ATM Services
- Kimberly Clark
- Kubota
- Lands' End
- Legacy Property Group
- Lockheed Martin
- Macy's
- Manheim Auto Auctions
- Marcus Autism Center
- Marietta City.
- Mars
- Matador Distributing
- McKinney's
- MicKoson
- MLCane
- MedShare International
- Metro Atlanta Regional Transportation Authority
- Michelin
- Midtown Consulting Group
- Monday Night Brewing
- MSC
- MCR
- 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
- PredixT
- Project Open Hand
- Publix
- RaceTrac
- Radiant
- Rainmaker
- Reliance Electric
- Remington Medical Supply
- RMI
- RockTen
- Rockwell Collins
- Roswell Recycling
- Ryder
- Saa
- Salvation Army
- Sandox
- Sandvik Mining & Construction
- ScheduleWise
- Scientific Atlanta/Cisco
- Shaw Industries
- Sherwin-Williams
- Siemens
- Southeastern Pneumatic
- Southern Company
- Spectral Response
- Starline Associates
- Summit Industries
- SunTrust
- SynT Solutions
- The Children's School
- Title
- 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
- USG
- UTI
- Vertical Brands
- VF
- Virgin America
- Virginia Dominion Power
- Volunteer Express
- Waffle House
- Wali-Mart
- Way Furniture
- WellStar Kennestone Hospital
- Whirlpool
Step 2: Finding Project: Requirements

- Requirements
  - Design
    - Make recommendations, not just a tool
  - ISyE knowledge/methods
  - Magnitude
    - 12 hrs/person/week = 1080-1440 hrs total (full-time job ≈ 2000 hrs)
  - Value to client

- 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
  • 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

• Selection of a primary contact/champion 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
  ▪ Response time
  ▪ Location
• Participation
Client notification body

Who is the client?
Give a brief description of the client and the division you are working with — nature of business, size, history, market share or other information that provides a clear picture of the client.

Who is the client contact?
Give the name, position, and contact information for the person who will be your primary working contact.

What is the system?
Briefly describe the system you will be studying, designing, or re-designing.

What are the opportunities for improvement?
Describe the opportunity your design project will focus on? How does your design manifest in terms of cost, profit, injuries, environmental hazard or other ways that are important?

What is the opportunity worth?
Discuss the nature of the value you will create for your client. This may not always be monetary.

What will you deliver to your client?
Describe briefly the deliverables you will present to the client. An application, a report, etc.

What is the relationship to the ISyE curriculum?
Explain how the work you will do is supported by the ISyE curriculum. What specific "IE methods and tools" will you use, why will you use them, and what will you gain from using them?
1. Who is the client?
Describe the client and the division you are working with – the nature of the organization, history, size, or other information that provides a clear picture of the client.

2. Who is the client contact?
Give the name, position, and contact information for the person who will be your primary working contact.

3. What is the system?
What system will you be studying, designing, or re-designing?

4. Is an NDA required?
Does your client request an NDA, confidentiality agreement or intellectual property agreement. If yes, where are you with respect to the steps outlined in the NDA process.

5. What are the opportunities for improvement?
Describe the opportunity your design project will focus on? How does your design manifest in terms of cost, profit, injuries, environmental hazard or other ways that are important?

5. What type of information do you need to take on the challenge?
Describe what information you need to explore the opportunities: the production history, the customer orders, patient flows, the resources the client own, work standard, the layout, etc.

6. What is the value of the opportunity you identified?
What is the value you will create for your client. Traditionally, this is cost savings. In many systems, it can also be quality or service improved, market expanded, etc. Georgia Tech’s mission is “improving human conditions”. Georgia Tech’s education enhancement is Serve-Learn-Sustain. From these perspective, the value can be number of people served, environmental footprint reduced. The rule of thumb is if the client hired a consultant, the project would cost over $100,000.

7. What will you deliver to your client?
Describe briefly the deliverables you will present to the client: a report, a model, an application extension, scheduling tools, etc.

8. What is the relationship to the ISyE curriculum?
Explain how the work you will do is supported by the ISyE curriculum. What specific "IE methods and tools" will you use, why will you use them, and what will you gain from using them?

- < 10% are good
- > 50% require major changes
- ~ 15% need to change client
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
   - You have a Client
   - Coordinator will review, ask you for more information then send to GT legal
   - GT legal negotiates with Client
   - Students return signature sheet to coordinator
   - Students return your NDA commitments

2. Must have NDA?
   - No
   - Fill out and send NDA form to coordinator
   - Sign individual NDAs with client (Must meet 3 conditions)*
   - Find another Client

3. Negotiations Successful?
   - No
   - Coordinator sends you PIAs for individual signatures and Signature Sheet
   - Students sign PIAs and send as one individual file back to coordinator
   - Students acquire signatures of all GT employees who will access protected information
   - Students return signature sheet to coordinator
   - Coordinator sends you PIAs for individual signatures and Signature Sheet
   - Find another Client

* 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 fill 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 get each member fill out these 4 fields, and sign
2. Liaison combine into single file
3. Liaison send the file to coordinator
The signature sheet SS (2nd page)

<table>
<thead>
<tr>
<th>Required Signatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature</th>
<th>Name</th>
<th>Date</th>
<th>U.S. Citizen</th>
<th>Green Card</th>
<th>Country of Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chen Zhou</td>
<td>Chen Zhou</td>
<td>December 20, 2016</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
</tbody>
</table>

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

*NDa with: Home Depot U.S.A., Inc.
Attorney: SDE GT OLA File: NDA-4702 POC: Chen Zhou
GT Entity GIT Effective Date: December 7, 2016 Termination Date: May 31, 2017
Term of Confidentiality: 5 years/initial disclosure Pertaining to:
optimization of HD’s decision-making process for the introduction of new product to its stores

Bring with you
Get signatures
Submit with final report
We cannot read without
DON’T FORGET!!

• REGISTER FOR ISYE 4800/4800R/4800Q

• 4106 PREREQUISITES

• START NDA ASAP, FOLLOW INSTRUCTIONS

• PRE-PROPOSAL MUST INCLUDE DATA AND ANALYSIS AND VALUE
Step 3: 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!
  • Background
  • Data/analysis to support the size/scope/value of 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 coordinator and your contribution is satisfactory

53/54 teams in last 3 semesters got approval
Step 3: Project Pre-Proposal

• 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.
Communications

• Meaningful email subject line
• Meaningful document name (pay attention to template)
  • Team: Liaison’s name
  • Client notification: TeamNumber + ClientName (to be given)
    • E.g. 11 Staples
  • Preproposal: TeamNumber + ClientName + Type of project
    • E.g. 11 Staples OrderPicking (to be given)
• Piazza
Warnings

• You must contribute to your team’s preproposal; 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
4800 FAQs

• 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 Dr. Nazzal 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?
  • 0.5 letter grade deduction from your ISYE 4106 grade.
Recent national/international awards for Senior Design projects

• IIE (Now IISE) best student paper award
  • 1st place internationally, 2015; 2nd place internationally, 2009

• INFORMS best student paper award
  • Runner-up national & international, 2010 & 2011 & 2012

• INFORMS Finalist for Undergraduate O.R. Prize Competition 2017

• INFORMS “Doing Good with Good OR” competition
  • Finalist, 2010 & 2011 & 2014(2)...competing against PhD students!

• ...and others would’ve won too, but were constrained by NDAs
What to look for in 4106

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

Georgia Tech
Stewart School of Industrial & Systems Engineering
Questions?

• Piazza
• Dr. Nazzal; dima.Nazzal@isye.gatech.edu
• Dr. Sharp; harry.sharp@isye.gatech.edu
• Your assigned examiner
• Please don’t ask other faculty
My questions to you

- 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?