Introduction to ISyE 4800 Senior Design Pre-planning (& ISyE 4852)

Coordinator: Chen Zhou, czhou@isye.gatech.edu
Administrator: Harry Sharp <hsharp@isye.gatech.edu>

Tuesday, January 9, 2018
6 - 7 PM, IC 103
Today’s topics

• What are 4106 and 4800?

• What you need to finish in 4800?

• When you need to do what?

• What is 4852 and what will you get?
# 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, NDA collections, website</td>
</tr>
<tr>
<td>Chen Zhou</td>
<td><a href="mailto:czhou@isye.gatech.edu">czhou@isye.gatech.edu</a></td>
<td>Coordinator</td>
<td>Info session, coordinate activities</td>
</tr>
<tr>
<td>TBD</td>
<td></td>
<td>Examiner</td>
<td>Project screening in summer for fall</td>
</tr>
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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 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
• ...

Georgia Tech ISyE
Professionalism starts now!

• Misbehavior 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
     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

1/12/2018
# 4800 Summer schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Time</th>
<th>What</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>M</td>
<td>4/9</td>
<td>10:00</td>
<td>Team Composition Report</td>
<td>T-square by liaison</td>
</tr>
<tr>
<td>3</td>
<td>T</td>
<td>5/29</td>
<td>10:00</td>
<td>Client/Project notification</td>
<td>T-square by liaison</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>6/25</td>
<td>10:00</td>
<td>Initial Pre-proposal</td>
<td>T-square by liaison</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>6/26</td>
<td>10:00</td>
<td>Examiner Assignment, signup for meetings</td>
<td>Piazza post, email</td>
</tr>
<tr>
<td>7</td>
<td>T-R</td>
<td>6/26-6/29</td>
<td>N/A</td>
<td>Meet with SD examiner(s)</td>
<td>Office, seminar room, or video</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>7/23</td>
<td>10:00</td>
<td>Revised Pre-proposal (if needed, most do)</td>
<td>T-square, or follow examiner’s instructions</td>
</tr>
<tr>
<td>11</td>
<td>T-R</td>
<td>7.24-7/27</td>
<td>N/A</td>
<td>Meet SD examiner(s), (if needed)</td>
<td>Office or seminar room</td>
</tr>
<tr>
<td>12</td>
<td>F</td>
<td>8/3</td>
<td>10:00</td>
<td>Mandatory peer Evaluation</td>
<td>T-square, Assignments</td>
</tr>
<tr>
<td>by W</td>
<td>8/22</td>
<td>10:00</td>
<td></td>
<td>Notification of permit</td>
<td>E-mail</td>
</tr>
</tbody>
</table>

1/12/2018
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>
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<tr>
<th>Time</th>
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<tr>
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<td>12:10 – 2:55</td>
<td>MWF</td>
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<td>MWF</td>
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<td>6:00 – 8:45</td>
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<td></td>
<td>MWF</td>
<td></td>
<td>TR</td>
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</table>
Step 1: Build yourself a team

- 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>
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</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.
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!)
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

4852 may help
Client (project) notification title

File name: TeamNumber Client Name (Abbreviation is acceptable). The team number will be given after your Team Composition Report.

Client_name:
Client/Project Notification

Lname1, Fname1
Lname2, Fname2
Lname3, Fname3
Lname4, Fname4
Lname5, Fname5
Lname6, Fname6
Lname7, Fname7
Lname8, Fname8

* Team Liaison person and e-mail

Date:
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?
File name: TeamNumber ClientName ProjectType. The project type will be given after Client Notification report.

Client_name: Preproposal

Lname1, Fname1
Lname2, Fname2
Lname3, Fname3
Lname4, Fname4
Lname5, Fname5
Lname6, Fname6
Lname7, Fname7
Lname8, Fname8

* Team Liaison person, Liaison’s e-mail

Date:
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?
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 term 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

- **Start**
  - Avoid NDA because of single term academic project
    - **Successful**
    - **No NDA**
    - **Unsuccessful**
      - Show client the GT One-Way NDA
        - Client requests change
          - Send NDA routing form to Administrator
            - Sign Client NDA 3 Conditions See Manual
              - **Not possible**
                - Show client the GT One-Way NDA
                  - Coordinator send to GT Legal
                    - GT Legal prepares Student PIA and sends to Coordinator
                      - Coordinator obtains student signatures on PIA and returns signed to GT Legal
                        - Coordinator acquires student signatures on PIA and returns signed to GT Legal
                          - **End**
                            - Student acquire signatures and returns SS Coordinator
                              - Administrator send SS and PIA to students
                                - Fully Executed SS and PIA to Administrator
                                  - Administrator returns completed SS to GT Legal
• 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.
Student PIA

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)

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

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: Chen Zhou
Name: Chen Zhou
Date: December 20, 2016
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:

Signature:
Name:
Date:
U.S. Citizen ☐  Green Card ☐  Neither ☐
If Neither, Country of Origin:

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

1/12/2018
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 Dr. Blake (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.

4852 may help

1/12/2018
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 you begin the pre-proposal process, your teammates are counting on you.
  • Individuals will not be allowed to drop from their team.
    • 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.
    • If I’m not in my office, send Prof. Swann, or Vande Vate or Zhou 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 once T-square site is up.

1/12/2018
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
  • …
Questions?

• Piazza
• Profs. Zhou or Examiner
• Your assigned examiner or Prof. Zhou

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<td>Schedule, reservations, report, NDA collections, website</td>
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• Please don’t ask other faculty
  • They’re paid for other things.
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?
So, you are

Do what I want to do
Almost out of here

Team and project
Teamwork
Project management
Writing
Presentations
ISyE designed a course for you

ISyE 4852 Project Development & Management
ISyE 4852 Project Development & Management

• 2 credits
  • F 10:10 – 11:00, class
  • F 11:15 – 2:00, Practicum

• To be taught by experts
  • Brandy Blake: Technical writing
  • Tim Brown: Project management
  • Ron Johnson: Teamwork and leadership
  • Judith Norback: Presentations
  • Invited speakers from industry

• You will learn practical techniques to improve yourself
What will you get?

• Eligibility to take exam for Certified Assoc. in Project Management
• Learn technical writing
• Learn presentations
• Learn to perform well in a team
• Learn to lead
• Help your senior design team to do better
Why

• Industry and employer demand
  • Business case development
  • Project management
  • Technical communications: writing and oral
  • Teamwork and leadership

• ISyE advisory board strongly recommends

• Some students developed via their work experience or professional organizations

• Many are lacking
An analogy: if you have these

• You have learned Excel to manage data
• You have learned Tableau for data presentation
Project management

• Engineering is a project based profession
  • Consulting, In one organization, your life is full of “projects”

• A lot of underperforming SD projects are due to poor project management

• Many IE programs include project management classes: this is a better rendition

• Atlanta has 3rd highest no. of certified PM in the world

• Project Management Institute
  • Founded by GT alumni James Snyder at GT and funded by ISyE Professional Education

• Receive PM training at no extra cost that can be applied to certification
Technical writing

• Technical writing is different from literary writing and from English 1101 and 1102.
  • Focuses on explaining technical information clearly to non-IEs, on being concise and specific, on avoiding overly-sophisticated language or jargon, on developing reader-centered visuals, etc.

• A third of your Senior Design grade is determined based on how well you write a report.

• ISYE Alumni reported that writing is one of the most important skills that they needed to learn while at Georgia Tech.

• "Communication skills ranked as the most or second-most desired baseline skill in all industries." ("The skills employers are looking for": http://www.cnbc.com/2015/12/01/the-skills-employers-are-looking-for.html)
Presentation

• Customizing to the audience
  - Creating first impression and using concrete examples

• Telling the story
  - Checking logical flow

• Displaying key information
  - Using effective graphics

• Delivering the presentation
  - Using appropriate vocal quality and personal presence
  - Answering questions
  - Avoiding memorization
Teamwork and leadership

• Weeks 1 and 4
• Lecture on Tuchman Model and Group Dynamics
• 4.5 hours of hands-on teamwork practicum on our Leader Challenge Course

• Every semester, there are students have difficulty finding teams. 4852 can help you to find teams!
<table>
<thead>
<tr>
<th>Wk</th>
<th>Day</th>
<th>Content</th>
<th>Instructor</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1/12</td>
<td>Leadership &amp; Teamwork</td>
<td>Johnson</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1/19</td>
<td>Project Mgt 1</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1/26</td>
<td>Project Mgt 2</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2/2</td>
<td>Team Dynamics 1</td>
<td>Johnson</td>
<td>Done at GT challenge course</td>
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<tr>
<td>5</td>
<td>2/9</td>
<td>Presentation 1</td>
<td>Norback</td>
<td></td>
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<td>2/16</td>
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<td>Spring Break</td>
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<tr>
<td>12</td>
<td>3/30</td>
<td>Technical writing 2</td>
<td>Blake</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>4/6</td>
<td>Technical writing 3</td>
<td>Blake</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>4/13</td>
<td>Project Mgt 6</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4/20</td>
<td>Presentations</td>
<td>Team</td>
<td>Presentations by the students</td>
</tr>
<tr>
<td>16</td>
<td>4/27</td>
<td>Final Exam starts on 4/26. There is no activity for 4852</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Your options

- 4800
  - No credit
  - No tuition
  - Some work

- 4802
  - 2 credits
  - No tuition if > 7 credits
  - More work
  - More gain
    - Certification
    - Confidence in SD
    - Develop better project
    - Manage project better
    - Provide better results for the client
    - Personal development
What the students from last batch say

• 4852 sets you up for senior design, prepare you for business world
• Technical writing is different from what you have learned, help you understand what Pre-proposal is asking for.
• Presentation is incredibly helpful, a lot of good feedbacks
• Project management help you to communicate, organize and manage project
• Teamwork is very useful and fun! (best with team members)
• Get to know faculty at personal level
• This course needs to be required for all
• Great training for a future in business world and awesome for SD